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ILLUSTRATIONS
OF THE
INFLUENCE OF THE MIND UPON
THE BODY
IN HEALTH AND DISEASE

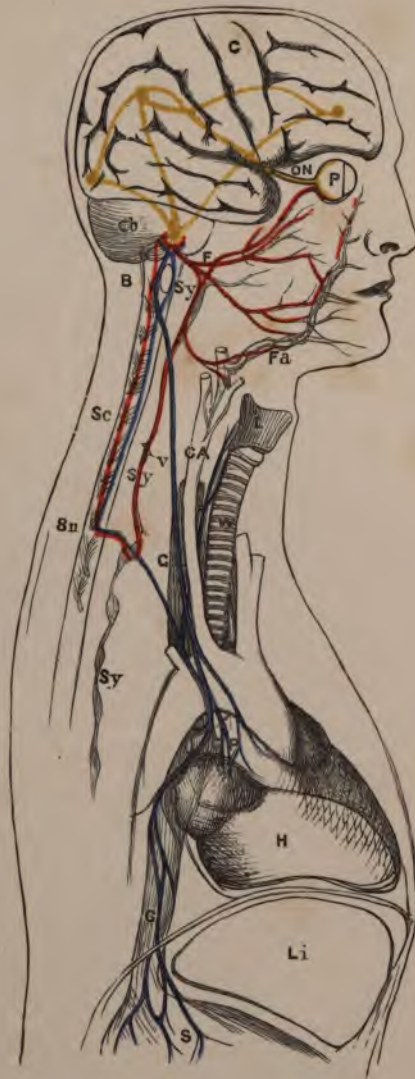
“There is not a natural action in the Body, whether involuntary or voluntary,
that may not be influenced by the peculiar state of the mind at the time.”

JOHN HUNTER.

"Some are molested by Phantasie; so some, again, by Fancy alone and a good conceit, are as easily recovered. . . . All the world knows there is no vertue in charms, &c., but a strong conceit and opinion alone, as Pomponatius holds, *which forceth a motion of the humours, spirits, and blood, which takes away the cause of the malady from the parts affected.* The like we may say of the magical effects, superstitious cures, and such as are done by mountebanks and wizards. As by wicked incredulity many men are hurt (so saith Wierus), *we find, in our experience, by the same means, many are relieved.* . . .

"Imagination is the *medium deferens* of Passions, by whose means they work and produce many times prodigious effects; and as the Phantasie is more or less intended or remitted, and their humours disposed, so do perturbations move more or less, and make deeper impression."—*Anatomy of Melancholy*. BURTON, 1651.

DIAGRAM I.



For Explanation see p. xxiii.

ILLUSTRATIONS
OF THE INFLUENCE OF
THE MIND UPON THE BODY
IN HEALTH AND DISEASE
DESIGNED
TO ELUCIDATE THE ACTION OF
THE IMAGINATION

BY
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SECOND EDITION

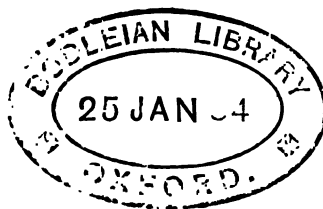
VOL. I

LONDON
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1884

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TO
SIR JAMES PAGET, BART., F.R.S., D.C.L. OXON.
SERJEANT SURGEON-EXTRAORDINARY TO THE QUEEN.
LATE LECTURER ON GENERAL ANATOMY AND PHYSIOLOGY
AT
St. Bartholomew's Hospital
AND
Warden of the College
IN GRATEFUL ACKNOWLEDGMENT
OF
THE INFLUENCE OF
HIS HIGH MORAL AND INTELLECTUAL QUALITIES
THIS WORK IS INSCRIBED
BY
AN OLD PUPIL

PREFACE
TO THE
FIRST EDITION

IN November, 1869, I met with the following in a newspaper under the heading of "The Curative Effects of a Railway Collision :"—

"Allow me to confirm all that your two correspondents have related with respect to the alarming collision on the 17th instant, on the Midland line.

"Nothing needs to be added either to their descriptions of the circumstance or to their just condemnation of the reckless negligence which brought us so near to death ; but the shock produced so curious an effect on myself—an effect, perhaps, unparalleled in the history of railway accidents—that you will, perhaps, excuse my troubling you with the details.

"At my hotel in Manchester on Tuesday night I was seized with all the symptoms of a violent attack of rheumatic fever ; in fact, my condition so alarmed me, and my dread of a sojourn in a Manchester hotel bed for

two or three months was so great, that I resolved to make a bold *sortie*, and, well wrapped up, start for London by the 3.30 p.m. Midland fast train from the London Road terminus. From the time of leaving that station to the time of the collision, my heart was going at express speed ; my weak body was in a profuse perspiration ; flashes of pain announced that the muscular fibres were under the tyrannical control of rheumatism, and I was almost beside myself with toothache. Crash ! smash ! bump ! and bang ! and from side to side of the carriage I went like a billiard ball under a hard cushion hit. The compartment was soon seen to be sprinkled with the blood of a hapless victim whose face had come into crushing contact with it."

The rest of this part of the paper was unfortunately wanting, but I learnt from other sources that, as the heading intimated, the patient was cured of his rheumatism. The remarks which this circumstance elicited from the press (general and medical) led me to think that the whole subject of the influence of the Mind upon the Body, deserves more serious and systematic consideration than it has received. In forwarding soon after to the ' Journal of Mental Science ' * a paper bearing the title of the present work, I observed : " It is now some

* About 190 pages have appeared in that Journal. The chapters already published have been much extended, and Part IV, treating of the Influence of the Mind upon Disease, is, in common with several chapters, entirely new.

time since I endeavoured to formularise the generally admitted facts of physiology and psychology so far as they bear on this question, and to collect from the sources at my command all authenticated facts illustrative of this influence. Dissatisfied with my work I laid my cases aside. Judging, however, from the remarks made, that imperfect as these cases are they may be of some service, I conclude to forward them to the Journal of the Association."

The objects of the following pages may be thus stated :

1. To collect together in one volume authentic Illustrations of the influence of the Mind upon the Body, scattered through various medical and other works, however familiar to many these cases may be, supplemented by those falling within my own knowledge.
2. To give these cases fresh interest and value by arranging them on a definite physiological basis.
3. To show the power and extent of this influence not only in health in causing Disorders of Sensation, Motion, and the Organic Functions, but also its importance as a *practical* remedy in disease.
4. To ascertain as far as possible the channels through, and the mode by, which this influence is exerted.
5. To elucidate, by this inquiry, the nature and action of what is usually understood as the Imagination.

"Quicquid agunt homines, votum, timor, ira, voluptas,
Gaudia, discursus, nostri est farrago libelli."

There are two classes of readers to whom I wish more especially to address myself. The medical reader who, I hope, may be induced to employ Psycho-therapeutics in a more methodical way than heretofore, and thus copy Nature in those interesting instances, occasionally occurring, of sudden recovery from the spontaneous action of some powerful moral cause, by employing the same force designedly, instead of leaving it to mere chance. The force is there, acting irregularly and capriciously. The question is whether it cannot be applied and guided with skill and wisdom by the physician. Again and again we exclaim, when some new nostrum, powerless in itself, effects a cure, "It's only the Imagination!" We attribute to this remarkable mental influence a power which ordinary medicines have failed to exert, and yet are content, with a shrug of the shoulders, to dismiss the circumstance from our minds without further thought. I want medical men who are in active practice to utilise this force, to yoke it to the car of the son of Apollo, and rescuing it from the eccentric orbits of quackery, force it to tread, with measured step, the orderly paths of legitimate medicine. "Remember," said Dr Rush in addressing medical students, "how many of our most useful remedies have been discovered by quacks. Do not be afraid, therefore, of conversing with them, and of profiting by their ignorance and temerity. Medicine has its

Pharisees as well as religion ; but the spirit of this sect is as unfriendly to the advancement of Medicine as it is to Christian charity.”*

The other class comprises those non-medical readers who may happen to peruse this work ; and these, the author hopes, may be disposed to regard in a different light from what they may heretofore have done, the success of some of the fashionable modes of treatment current at the present day. Some of those, also, who are interested in the manifestations of Modern Spiritualism, may find it worth their while to acquaint themselves fully, *in the first instance*, with those phenomena which may certainly be explained by a reference to the principles laid down in these pages. From this point of view this book may, perhaps, be regarded as somewhat of an introduction to the study of the alleged facts, which now attract so much attention, for whatever may be the explanation ultimately arrived at in regard to them, it is equally essential to ascertain what is the range of the phenomena which can be fairly explained by well-recognised psycho-physical principles.

* He thus continues, after reminding his class that improvement in Medicine is not to be derived only from colleges and universities, “In the pursuit of medical knowledge, let me advise you to converse with nurses and old women. They will often suggest facts in the history and cure of diseases which have escaped the most sagacious observers of nature.” He adds that by so doing “you may discover *laws of the animal economy which have no place in our systems of nosology or in our theories of physics.*”

Cerebral Physiology and Mental Philosophy have been referred to, so far as is essential to elucidate by the application of admitted principles, the cases which are recorded in this work. The collection of so many striking illustrations of the profound influence of the Mind upon the Body would alone serve to convince the reader of the absurdity of dismissing such cases with the flippant remark just referred to, as if the Imagination could solve a great many difficult and inconvenient problems, but could never be employed for any useful practical purpose. But however valuable a simple collection of cases may be, and certainly "Truth can never be confirmed enough," the author thought its value would be greatly enhanced by arranging them in accordance with the generally received psychological and physiological principles.

If the labour and thought required to prepare a reliable collection of psycho-physical phenomena, such as the present work contains, be any measure of its utility to the reader in quest of facts of this nature, I venture to hope that such an inquirer will not be unthankful for the assistance now rendered him; and to those who are familiar—possibly *ad nauseam*—with many of the cases which are given, I am inclined to think, judging from my own experience, that they will find it convenient to have in one volume, for ready reference, a number of cases not readily found in the Journals and many publications of an ephemeral character. My aim therefore

has mainly been to ascertain and apply the already known.
As Browning says—

“ To shoot a beam into the dark assists ;
To make that beam do fuller service, spread
And utilise such bounty to the height,
That assists also, and that work is mine ;”

holding, as I do, with Lord Bacon, that “ Every man is
a debtor to his profession, and ought of duty to endeavour
to be a help thereunto.”

August, 1872.

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ERRATA

Page 117, line 12, *for* xlix *read* xcvi.

„ 311, *delete* note.

EXPLANATION OF DIAGRAM I

To illustrate the paths along which nerve impulses causing the Emotional Phenomena of (1) Blushing, (2) Dilatation of the Pupil, (3) Quickening or Slowing (to Stopping) of the Heart's beat, and (4) Sensation at the pit of the Stomach (Epigastrium), when an individual's attention is visually attracted by an exciting cause.

C =Surface of brain (cortex).

ON =Optic nerve.

P =Pupil (seen in profile).

Cb =Small brain or cerebellum.

B =Medulla oblongata.

Sc =Spinal cord.

Sy =Sympathetic nerve.

F =Facial nerve.

8n =Eighth cervical spinal nerve.

CP =Cardiac plexus of nerves.

R =Recurrent laryngeal nerve.

V =Vagus nerve.

G =Gullet.

W =Windpipe.

L =Larynx (vocal apparatus).

S =Stomach.

H =Heart.

CA=Carotid artery.

Fa =Facial artery.

With the aid of the diagram it is easy to understand how that the stimulation of the optic nerve (ON) will cause active disturbance of the corpuscles forming the cortex of the brain, first, probably in the postero-lateral area (the sensory perceptive centre for vision); and, secondly, the anterior and posterior regions. From each of these

positions the nerve vibrations, having aroused intelligent reasoning and strong emotion, will stream down to the medulla oblongata (between Cb and B) where the centres of so-called organic life are all grouped together. These paths are represented yellow. Here the emotional impulses will, under certain circumstances of love, shame, &c., pass along (F) the facial nerve, and thus cause movements of the facial muscles, and so produce facial expression, and also will pass by the same means to the local vaso-motor apparatus, and cause dilatation of the small arterioles, &c., producing the phenomenon of blushing. In addition the emotional impulse will pass down the spinal cord (Sc) and out along the eighth spinal nerve (8n), then running up the sympathetic nerve (Sy) will reach the pupil (P) and actively dilate it. All these channels are coloured red. Under other circumstances, such as fear, rage, &c., the emotional impulse will pass at once from (B) into the sympathetic (Sy), and then to the facial blood-vessels (Fa), causing these to contract strongly, and also along the facial nerve (F), making the muscles to act spasmodically, thus producing pallor and the expression of terror. Interference with the regular beating of the heart is brought about by the nerve force passing down either the vagus nerve (V) with the effect of slowing the heart or actually stopping it, or else along the spinal cord and out along the spinal nerves to the sympathetic and so to the cardiac plexus, these impulses quickening the heart's rate. But, in addition, the voice is materially altered, and this is produced by the emotional impulse travelling down the vagus nerve (V), then up along a branch of the same (R) to the voice apparatus or larynx, and by causing irregular or excessive contraction of the muscles therein produce abnormal tones. Lastly, the sensation at the pit of the stomach may be entirely subjective and produced in the bulbar centres (B) at least without actual disturbance of the vagus nerve endings, or it may be that the emotional nerve force travels down to the stomach (S) along the distribution of the nerve (V), and is again reflected thence to the cortex of the brain.

.

ILLUSTRATIONS
OF THE
INFLUENCE OF THE MIND UPON
THE BODY

INTRODUCTORY

THE Mind acts upon the Body through its threefold states of—

- I. INTELLECT.
- II. EMOTION.
- III. VOLITION.

The terms chosen for the title of this work accord with popular usage, and are probably less likely to mislead than any others which might be used. It is more than probable that no amount of scientific knowledge will ever displace the time-honoured phrases of "Mind" and "Body."

Psychologically, we intend to indicate by the title we have adopted, the design of illustrating by a considerable collection of striking Cases the often admitted, but too frequently forgotten, and still more frequently neglected, truth, that the state of the Mind, comprising therein Intellect, Emotion, and Volition, exerts an enormous influence, for good or evil, upon the body with which it is associated—including in this term all Sensations,

Movements, and the Organic Functions. It must be clearly understood that under "Mind" we do not, and that under "Body" we do, include the special senses. Sensation (special and general) is treated of, as being influenced by intellectual, emotional, and volitional states.

Physiologically considered, the Illustrations range over the effects produced by the action of the nerve corpuscles of the encephalic centres concerned in intellectual, emotional, and volitional states of mind, upon the sensory and motor ganglia, the centre of the sympathetic, and through the outgoing nerves upon the whole body. Whether pure Emotion is a function of the hemispheres, and if not, to which of the lower ganglia it should be consigned, are questions upon which differences of opinion still exist, and will claim some attention in a future section. Be this as it may, however, the cerebral hemispheres act upon the ganglia below them, so far as the Intellect and Will are concerned; and, further, whatever cerebral physiology may teach as to minute points, the Cases brought together in this volume will none the less illustrate the truth, and the importance of the truth, that the Mind or brain influences—excites, perverts, or depresses—the sensory, motor, vaso-motor, and trophic nerves, and through them causes changes in Sensation, Muscular Contraction, Nutrition, and Secretion.

The bearing of the doctrines of the reflex or automatic action of the brain, and of the influence transmitted through vaso-motor nerves, will be considered as we proceed. Their importance must be evident to all who have studied the action of Mind upon Body.

PART I

THE INTELLECT

CHAPTER I

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES

SECTION I.—Retrospective Sketch

Unzer and John Hunter were among the first clearly to perceive and express the mental or psycho-physical law which lies at the foundation of the principal phenomena properly comprised under the influence of the Intellect or Thought upon the body, including sensation as well as motion, especially in regard to the effects of Expectation, and what is ordinarily understood as the Imagination. Thus Unzer in his great work, published in the year 1771, writes: "Expectation of the action of a remedy often causes us to experience its operation beforehand" (i, p. 113).

There is another striking observation made by this physiologist, bearing upon the influence of intellectual states upon the body. He supposes the case of a person who sees a visionary figure resembling an individual who caused him bitter vexation long before. He becomes pale with fear. This occurs, Unzer points out, before

he remembers whom the figure resembles. There is no action of the Will, and no consciousness in the sense of recognition. "How often in such cases," he remarks, "we hear persons say, 'This appearance terrifies, affects, or calms me, without my knowing why; some subordinate ideas, which I cannot remember, must be the cause.' When the person whose figure we have seen, actually appears also, no other action results than as stated above; we become pale as before, but now we know why" (p. 120).

Hunter had his attention drawn to the phenomenon of Animal Magnetism, and in his lectures on Surgery (1786-7), delivered a few years later than the appearance of Unzer's work in Germany, explained those which he witnessed on the principle of Attention and Expectation. There is no reason to suppose he was acquainted with Unzer's writings. He says:—"I was asked to go to be magnetized, but at first refused, because the spasm on my vital parts was very likely to be brought on by a state of mind anxious about any event, . . . and I feared lest it should be imputed to animal magnetism. But considering that, if any person was affected by it, *it must be by the Imagination being worked up by the attention to the part expected to be affected*, and thinking I could counteract this, I went; and accordingly when I went I was convinced by the apparatus that everything was calculated to affect the Imagination. When the magnetizer began his operations, and informed me that I should feel it first at the roots of my nails of that hand nearest the apparatus, *I fixed my attention on my great toe*, where I was wishing to have a fit of the gout; *and I am confident*

that I can fix my attention to any part until I have a sensation in that part. Whenever I found myself attending to his tricks, I fell to work with my great toe, working it about, &c., by which means I prevented it having any effect upon me" (ii, vol. i, p. 337). It is nearly a century ago since these sentences were written, and those which we have italicised show that the fundamental principle, to which we shall have so frequently to refer in this work, was most clearly comprehended by this remarkable man, who might have been as great a metaphysician as he was a physiologist. It really contains the gist of all that has been written since on the influence of Expectant Attention and the Imagination.*

Johannes Müller (1838) gave a luminous exposition of the influence of mental states, especially ideas upon the bodily movements. "The idea of a particular motion," he says, "determines a current of nervous action towards the necessary muscles, and gives rise to the motion independently of the will. Again, "any sudden change in the ideas, though without emotion, and having reference to mere external objects, may excite involuntary movements—as laughter" (iii, pp. 944, 1396). Under the heading "movements excited by ideas," he observes that certain groups of muscles are constantly prone to in-

* It does not follow from this explanation that Imagination, Expectation, and kindred states of mind, explain *all* the phenomena produced by mesmerists, nor indeed does it *necessarily* follow that the same phenomena are always due to the same cause. For our present purpose, however, we are justified in saying that certain purely psychical agencies produce certain physical results. With the alleged magnetism of A by B, we are not now concerned, most important and interesting as this would be, if proved.

voluntary motion, owing to the excitability of the parts of the brain from which the nerves arise. "The Sensorium acts here in the same way as an individual nerve in which any sudden change of condition, of whatever kind, sets the nerve force in action." He points out that, in yawning, the *disposition* to the movements of the muscles exists previously, and this "becomes manifested *when the idea gives to the nervous force the determinate direction.*"

Müller expresses himself as decidedly as John Hunter in regard to the influence of Expectation. "It may be stated, as a general fact, that any state of the body, which is conceived to be approaching, and which is expected with certain confidence and certainty of its occurrence, will be very prone to ensue, as the mere result of that idea" (iii, p. 1390). He only makes one condition, "if it do not lie beyond the bounds of possibility."

In connection with ideas, whether present to the consciousness or not, the action of the encephalic centres, apart from the Will, and the influence of this action upon sensation and the movements of the body, are of the first importance. The automatic or reflex action of the brain, which has attracted so much notice of late, cannot be disregarded in the consideration of the operation of the mental faculties upon the system.

Unzer, who, to a considerable extent, anticipated the observations of Marshall Hall in regard to the reflex action of the spinal cord, applied the same principle to explain many psycho-physical phenomena. In the following remarkable passages he enunciates the doctrine of the reflex action of the brain in regard to instinctive

acts:—"Any painful external sensation immediately excites the war-instinct, and the movements proper to the instinct as instantaneously follow, even in man himself, and before the cause of the sensation is known. Between the external sensation exciting the instinct and its sentient actions, no traces of conceptions can be discovered, consequently there are no material ideas of imaginations, foreseeings, &c. produced by the external sensations ; so that there appears to be a direct transition [Uebergang] of the latter into the instinct itself, and the material ideas proper to it to take effect in the sentient actions of the other. *So that it may, in some degree, be asserted that in the instincts, the brain turns back [umwendete] the felt impression, and reflects it on the nerves appropriate to the sentient actions of the instinct, just as an unfelt external impression is reflected in the ganglia,* and this without the material ideas of the conceptions necessary to the instinct becoming an object of special thought, they being too little developed ; and without its sentient actions being obviously excited and connected with each other, according to psychological laws" (i, p. 279).

Gall is shown by Professor Laycock (iv, p. 106) to have held the same opinion. He "fell into the views of Unzer and Prochaska. He applied them to the passions, and maintained that joy, sorrow, fear, &c., are not excited by the Will, but felt before the individual has so much as dreamed of them. All that passes is an arrangement produced by nature, intended for the external world, to secure 'la conservation de l'animal et de l'homme, sans qu'il y ait conscience, reflexion, ni participation active de l'individu.' Gall also asserted that *these passions, when of*

a certain intensity, are accompanied by actions which are independent of the Will and consciousness, but which all tend towards the end proposed by nature, namely, the conservation and ease of the individual; thus, in fact, classing the phenomena of the passions with the instinctive movements, and those excited by external stimuli, independently of consciousness and of the brain, and which have been remarked on by Unzer, Haller, Prochaska, Alison, Hall, Müller, and Grainger" (l. c.).

Müller, who was at the time acquainted with Marshall Hall's writings, observes that "reflected motions include all muscular actions which arise from impressions on sensitive nerves exciting motor nerves to action through the intervention of the brain and spinal cord (iii, p. 927). In this passage, the brain, it will be seen, is included in the range of reflex action.

Elliotson in 1837 became an enthusiastic believer in animal magnetism, and by his experiments at University Hospital, renewed attention was drawn, in England, to the mesmeric phenomena which attracted Hunter's notice, and which led him to the conclusion that they were due to Imagination, understood in the sense of Expectation; in short, that they could be explained on the principle that a certain state of mind induces certain bodily sensations, without charging "the subject" with imposture.

Laycock was one of those who investigated this subject with care. He observed (v, July, 1839, p. 25) that the mesmeric subjects who two years before had attracted so much attention—the Okeys—were "of the same family as the Pythian priestess, the wizards of Kamschatka, the whirling dervishes of India, the serpent-eaters of Egypt,

the second-sight men of the Highlands, the 'wise men' and prophets who may still be found in Yorkshire, all knowing how to excite convulsions, or delirium, or spectral illusions and somnambulism, in themselves or their dupes, by mental acts or drugs." In his 'Nervous Diseases of Women' (1840), he observes that the phenomena in these girls "were undoubtedly not feigned," but that Dr Elliotson, in endeavouring to ascertain their cause, "appears to have overlooked the influence which the Will can exercise on the brain, when both are habituated to the effort, and the almost incredible acuteness of the senses, and of cunning, developed in hysterical girls. It is quite a mistake to suppose that because a female appears not to *feel*, that she has not an acute sense of *touch*; or because she cannot *see*, that she cannot most acutely *listen*." "The phenomena of Mesmerism (so called) are all illustrations of the power of the Will over the brain" (iv, pp. 111, 355). He does not exaggerate when in the preface to his work, Laycock observes that "the action of the Will on the sensorial fibres of the brain, the nature and laws of sensation, the extension of the doctrine of the reflex function of the spinal cord to the encephalic ganglia, and all the consequences which necessarily follow, cannot fail, I think, to interest the intelligent professional reader, and afford matter for deep thought." And in his chapter, "The Instinctive Actions in relation to Consciousness; the Brain subject to the Laws of Reflex Action," he quotes the passage of Gall already given, and adds, "the importance of these doctrines is apparent. They corroborate the truth of the proposition already laid down, that the cranial ganglia (the part of

the cerebrum which may be considered as the seat of the passions), although the organ of consciousness, are subject to the same laws as those which govern the other ganglia, the diffused nervous system of animals, and the vital mechanism of vegetables." The reference here, it will be seen, is to the passions and the movements dependent on them (pp. 107, 172). The two points on which Dr Laycock insisted, were—first, the extension of Bell's demonstration of the distinction between the motor and sentient nerves, and so "placing the sensorial fibres under the power of the Will;"* and, secondly, the extension of Marshall Hall's doctrine to the brain; so "applying the laws of the excito-motory system to the phenomena, not of the spinal cord only and its prolongation, but to the brain also, and the diffused nervous system" (p. 86). He did not overlook the importance of involuntary Attention (as well as the Will), which he classed "with the conservative acts, or rather with the excito-motor phenomena," and illustrated it by the sensation a nervous female experiences on being pointed at, which "probably depends upon changes in the central terminations of the sensitive nerves, excited by the act of Attention."

Sir H. Holland, it should be observed, in the chapter on the "Effects of Mental Attention on Bodily Organs" in his very suggestive work, 'Medical Notes and Reflections,' 1839, took essentially the same view, basing his conclusions upon philosophical considerations.

* Müller held this view also: "There is in the central organs a power of voluntarily directing the mind to all the cerebral and spinal nerves, even to the nerves of common sensation and the nerves of special sense" (iii, p. 937).

Laycock points out that **Dubois** in his work on 'Hypochondriasis,' published in 1837, applied the same principle to the origin of that disease, and that **Bonnet** (about 1760) "maintained the views respecting the agency of Attention on the fibres of the brain which I have already advocated." Referring to Mesmerism, he adds that the phenomena will be useful in more than ever directing inquiry "to the action of Will on the sensorial fibres of the brain, and through these on the sensitive nerves, &c." (iv, p. 112-13).

Mr Braid, in the year following the publication of Laycock's book, Nov., 1841, did, in fact, throw a flood of light on the influence of the Mind upon the Body by his investigations of the above phenomena. His experiments were really a systematic repetition, on an extensive scale, of Hunter's experiment on himself.

He induced many of these mesmeric phenomena by his own method, which, he held, owed its success to "an impression made on the nervous centres by the physical and psychical condition of the patient, irrespective of any agency proceeding from or excited into action by another" (vi, 1843, p. 32).

One sentence in his book contains the pith of the whole subject as far as relates to the influence of the Imagination or Expectation:—"The oftener patients are hypnotised from association of ideas and habit, the more susceptible they become, and in this way they are liable to be affected *entirely through the Imagination*. Thus if they consider or imagine there is something doing, although they do not see it, from which they are to be affected, they *will become affected*; but, on the contrary,

the most expert hypnotist in the world may exert all his endeavours in vain, if the party does not expect it, and mentally and bodily comply, and thus yield to it" (op. cit.).

Further, in referring to the Okeys, he says, "I have varied my experiments in every possible form, and clearly proved the power of the Imagination *on those previously impressed*, as the patients have become hypnotized or not by the same appliance, according to the result which they previously expected. This readily accounts for the result of Mr Wakley's experiments with the Okeys" (p. 61). In subsequent publications Mr Braid examined and explained the phenomena of "Electro-biology."* The importance of Mr Braid's experiments and conclusions will be frequently referred to in this work.

Returning to Dr Laycock's important contributions to cerebral physiology in connection with involuntary and unconscious mental manifestations, it should be added, in chronological order, that, in his paper "On the Reflex Functions of the Brain," 1844 (vii, Jan., 1845), this doctrine was brought forward "in a more physiological

* Dr Grimes, Professor of Medical Jurisprudence in Castleton Medical College, U.S., published a work in 1845 on the subject; Dr Darling, an American, who excited much interest in it, in Edinburgh, in 1851, says this was long prior to the performance of any experiments of the kind. In 1849 the Rev. J. B. Dods lectured on "Electro-biology" before the Senate of the United States. Le Roy Sutherland, however, states that he was the first to exhibit these experiments at Boston, U.S., in December, 1843. Dr Collyer puts in a similar claim. In 1845 Dr Elliotson published some interesting experiments made on a person subjected to mesmeric manipulations, which showed the remarkable effects produced by suggestion in a susceptible state of the brain.

form," and in subsequent writings he has followed up the subject with great philosophical acumen. Dr Carpenter has, also, by his masterly exposition of the rationale of the phenomena of Mesmerism, so far as they are due to the influence of Expectant attention or dominant ideas, done essential service to this department of Mental Philosophy. Indeed, there is no standard physiological work which enters so fully into this class of phenomena as the fourth edition of his 'Human Physiology,' published in 1853.* His full admission of the genuineness of a series of facts suspiciously looked upon by medical men and physiologists, even as late as that year, and the use he made of them as illustrations of important principles in physiology, greatly advanced their recognition. His views and those of Professor Laycock diverge on the doctrine of sensation, and it seems right to state as concisely as possible in what this difference consists, in order that the reader may be in possession of the leading theories on this question. Writing on "Odyle, Mesmerism, and Electro-biology," Dr Laycock observes that "one great fact proper to all is, that the action of the Will and of Consciousness is suspended, and the encephalic ganglia placed in the condition of the 'true spinal' or reflex system" (vii, Oct., 1851).† Dr Car-

* Omitted in recent editions and comprised in Dr Carpenter's 'Principles of Mental Physiology,' published in 1874.

† The statement that "the action of the Will is suspended" differs from the same writer's previous observation, that "the phenomena of Mesmerism are all illustrations of the power of the Will over the brain" (p. 8). To some extent this is accounted for by there being an early or voluntary, and a later or involuntary, stage of artificial somnambulism. No doubt, however, the prominence given

penter, in his already-mentioned work, says that the point wherein he differs from Dr Laycock is in marking-out the distinction between the "*sensory* motor" or consensual actions, which are the manifestations of the reflex action of the sensory ganglia and the "*ideo-motor*" actions, which depend upon the reflex action of the hemispherical ganglia (viii, p. 800). Dr Laycock, on the other hand, holds that there is no "*essential* distinction" between the sensory and hemispheric ganglia—the intelligent responsiveness to stimuli being common to both, quite independently of sensation or consciousness, which "in the so-called *sensational* actions takes no share causally, and is only a coincident phenomenon not necessary to the acts" (ix, 1855, p. 513). They agree, however, in the fact of "unconscious cerebration," as applied to the hemispheres, which Dr Carpenter thus describes:—"Looking at all those automatic operations by which results are evolved without any intentional direction of the Mind to them, in the light of "reflex actions" of the cerebrum, there is no more difficulty in comprehending that such reflex actions may proceed without our knowledge, so as to evolve *intellectual products* when their results are transmitted to the sensorium and are thus impressed upon our consciousness, than there is in understanding that impressions may excite muscular movements, through the 'reflex' power of the Spinal Cord, without the necessary intervention of sensation. In both cases the condition of this form of independent by this writer to the action of the Will on the sensorial fibres of the brain in 1840 has been supplanted, to a large extent, by the fully-developed doctrine of the brain's automatic action.

activity is, that the *receptivity* of the Sensorium shall be suspended *quoad* the changes in question, either by the severance of structural connection, or through its temporary engrossment by other objects" (viii, p. 819).

The reader can hardly fail to remark incidentally, from this sketch, how powerful a stimulus has from time to time been given to the study of psycho-physical facts by peculiar conditions of the nervous system, artificially induced* and usually denominated mesmeric. The author believes that this mine is far from having been exhausted, and that, more systematically worked, it will well repay the cerebral physiologist.†

Glancing broadly, in conclusion, at the whole range of psycho-physical phenomena, it is clear that it would be taking a very contracted view of the relations between Mind and Body if we did not include in this relationship, a reference to the inseparable *nexus* existing between the two, arising out of the fact that the organ of the mind is the outgrowth and ultimate development of the tissues and organs of which the body itself is composed; that it not only unites them in one common bond, but is, in truth, a microcosm of the whole. It is a fine expression of Swedenborg's (a man who, through all his mysticism and mistiness, recognised some great truths) that the

* The application of these facts to mental diseases is attempted in my Essay entitled "Artificial Insanity," in the 'Journal of Mental Science,' April, 1865. See also "Hypnotismus Redivivus," Idem, Jan., 1881, and "Mental Condition in Hypnotism," Idem, April, 1883.

† This expectation, expressed in 1872, has happily been fulfilled, especially by the experiments made at the Salpêtrière by Professor Charcot, and by Professor Heidenhain at Breslau [1883].

likeness or image of the greatest is represented, as in a mirror, in the least, and of the least in the greatest; and he adds, "nor can anything be turned over *in the mind* that, if it please, may not be portrayed *in the extremes*, by means of the fibres; for instance, in action by the muscles. . . . There is a likeness of the brain in every fibre. The fibres carry with them the animus of the brain. . . . Cerebrum and cerebellum are universally present in the body by means of the fibres" (xxxiii, vol. i, p. 476, &c.). By a very different route he arrives at a conclusion which does not materially differ from that of the modern school of physiologists. If, then, the development of the minutest corpuscle in the body be a representation of the same principle that works in the formation of the organ of mind; if this organ consist of, and be an outgrowth from, such corpuscles; and if the brain be the grand centre which is in immediate relation with the structures and tissues which have preceded it, then, although these continue to have their own action—which they had before the brain was added, or have in animal life where no nervous system exists—that organ, one of whose functions is centralization, combination, or co-ordination, must be expected to act upon the Muscular tissue, whether striped or unstriped, the Organic Functions, and upon the Nervous System itself.

SECTION II.—Of various Mental States comprised under the Intellect. Definition and Elucidation.

Before proceeding to special cases, illustrative of the influence of the Intellect on the body, we shall endeavour to state briefly what we include under the term.

The use of the *intellectual powers* generally, falls under this division and involves mental application, hard study, or concentration of thought. The *Attention*, which, as we have already seen, plays so remarkable a part in the operations of the mind in its relation to the physical phenomena presented to our notice, will be included under this head also, although, in one form, an act of the Will.

Imagination belongs to those ideas which arise without any direct external stimulus. As the involuntary memory (almost spectral) of an object after its removal, Milton employs the word in 'Samson Agonistes,' when the messenger enters in hot haste to relate the catastrophe at Gaza :

“ Whither shall I run, or which way fly ?
The sight of this so horrid spectacle,
Which erst my eyes beheld, *and yet behold !*
For dire *imagination* still pursues me.”

The term is often used simply in the sense of active memory—Recollection. Thus, we sometimes speak of a certain taste being imagined, that is, recalled ; but more usually it is applied, as by James Mill, to those ideas or clusters of ideas which, in their combined form, have not at any time been present to the senses ; or to the sepa-

ration of classes of facts into their constituent elements, and combining them afresh, so as to form unreal representations, or scenes which have no existence—the sense in which Abercrombie employs it. If we combine Memory, the faculty by the operation of which we form an idea or image which is, and Imagination, the faculty by which we form an idea or image which is not, a copy of a previous impression, we may conveniently speak of recollective and creative Imagination. Common to both forms is the presence of an idea not immediately excited by any material form answerable thereto. As contrasted with the wide medical use of the word to which we shall shortly refer, this state might be termed Imagination proper. Nor would this be inconsistent with its derivation. Imaginatio, or Imago, a re-presentation to the mind, really means an imitation (*imago ab imitatione dicta*, Festus), and is traced back to εἶμα (from εἶκω, to resemble), an image. Imago is employed by Virgil ('Æn.,' ii, 560), to signify a mental image or likeness :

“Obstupui : subiit cari genitoris imago.”

Imago is used by Plautus to signify the impression made upon a seal ; a favourite metaphor for mental images.

The Greek synonym of imaginatio, φαντασία, from which our words Fancy and Phantasm are derived, signified the beholding of objects by the power of Fancy, or creating new objects by the Imagination. Quintilian, interpreting the word as used by Aristotle, says “per quas, imagines rerum absentium ita representantur animo, ut eas cernere oculis ac præsentibus habere videamur.” This

is Hallucination, answering to our Phantasm, and not Fancy as now employed, which does not go beyond an exaggerated degree of Imagination—creating what is “furthest removed from nature, fact, or sober reality” (Bain).

The Imagination, in its broad medical sense, which when properly understood and guided, is a complex mental power of the greatest interest and importance, must be considered under this section, although passing insensibly into emotional states. In reference to the difficulty of separating emotional and ideational states of mind, Herbert Spencer takes the case of perceiving a beautiful statue or even an ellipse or parabola, and points out the manifest impossibility of disentangling the cognitive from the emotional element.

With this form of Imagination are closely associated Expectation, Belief, Faith, Imitation, Sympathy, and Hope, some of these states involving the feelings more than others. The most superficial examination of the sense in which the term “Imagination” is employed by metaphysicians on the one hand, and popularly and medically on the other, will reveal the wide difference which exists between the two. In truth, as regards the present inquiry, it signifies, in popular and medical language, that a man imagines certain (bodily) phenomena to have occurred which have not; or it is meant that certain bodily phenomena which really have occurred, owe their existence solely to the influence of his imagination. The signification of the term contained in the first clause is too often assumed to be the whole truth. That of the second clause is almost, if not altogether, lost sight of.

Because effects are produced and cures performed by means of a mental condition called the Imagination, it is constantly assumed that these results are imaginary, in other words, that they are "all fancy." This is much to be deplored, and one of the objects we have in view is to dispel, as far as possible, so mischievous an error. It is generally implied that these phenomena are of a merely functional, subjective character, more or less dependent on the state of the mind, more especially the Will, and that a change of mental condition has been naturally followed by a change in the phenomena, although apparently physical. Such is the broad definition of the Imagination as it presents itself to the mind, when employed in reference to medical facts of every-day occurrence. This is what the orthodox medical practitioner means, as he complacently smiles, or is indignant, when the success of his heterodox rival is dinned into his ears, and he asserts that it was all the effect of the Imagination; and, in this sense, he is understood by his assailant. But the fact remains, and because it remains, and cannot be really explained-away, it must be explained. The essential must be separated from the accidental, and utilised for therapeutical purposes. It matters little to the patient by what name the remedy is called, whether "Imagination," or some of the many "pathies" of the day. It is emphatically a case in which "a rose by any other name will smell as sweet." But to the philosophical practitioner it ought to matter a great deal; it ought to be a question of extreme interest.

It is obvious then, that such signification of the term is widely different from that in which it is employed by

metaphysicians and (yet more so) by writers like Mr. Ruskin, who assigns to it a deeper meaning. On analysing the mental states comprised under the medical and popular use of the term, it will be found that the Attention is strongly directed to a part of the body with which certain phenomena are associated, that the ideas most vividly presented to the mind are in direct relation to them, and that the force of these ideas is intensified by accompanying states of mind already referred to—Expectation, Hope, or Faith. When a person on swallowing a bread-pill, in the belief that it possesses aperient properties, is purged, it is said to be through his Imagination; the mental condition present yielding, on analysis, a definite direction of thought to the intestinal canal; such leading idea exciting the same peristaltic action as would have been induced by castor oil. The force of this current of thought is augmented by Expectation. In such cases, the fixed idea is that certain phenomena will occur; for example, that there will be pain, or redness of the skin, or loss of muscular power, and should these supervene, we say it is due to the Imagination. This medical use of the term has for its basis that thinking upon an object which, as Dugald Stewart points out, is used by Shakespeare as synonymous with the Imagination, when he speaks of “thinking” on the frosty Caucasus, the “apprehension” of the good, and the “imagination” of a feast. It is the “conception” of Stewart. “The conception of a pungent taste produces a rush of saliva into the mouth; the conception of an instrument of torture applied to any member of the body, produces a shock similar to what would be occasioned by its actual applica-

tion." This is recollective Imagination, and merely involves the presence of a mental image of an object not present to the senses, but in the wider medical use of the word it becomes, as already stated, more complex, although by no means embracing the Imagination of those metaphysicians, with whom (Stewart, for example) it includes, not only conception or simple apprehension, but abstraction, "which separates the selected materials from the qualities and circumstances which are connected with them in nature, and Judgment or Taste which selects the materials and directs their combination." To these powers the above-mentioned metaphysician adds, Fancy.

Mr. Ruskin pronounces this definition meagre, and says the very point is missed, for Stewart omits from it the power of prophecy, which is the essence of the whole matter. The composition which Stewart regards as Imagination has no part or lot in it. Such a composer only copies the remembered image ; with Ruskin it is a penetrating faculty, reading truths, discoverable by no other faculty, as well as a combining associative power which creates new forms, and one which regards simple images and its own combinations in peculiar ways. It is greatly dependent on acuteness of moral emotion. In its highest form, it is "altogether divine," and out of an infinite mass of things, seizes two that are fit for each other, and are together right, although disagreeable alone. "It is the grandest mechanical power that the human intelligence possesses, and one which will appear more and more marvellous the longer we consider it." It is an operation of mind "altogether inexplicable," and can

only be compared with chemical affinity. But it is not necessary to refer further to this aspect of the Imagination; enough has been said to show that the various significations attached to the term, must not be allowed to mislead us, and that we are not concerned with the faculty understood in the Ruskinian sense, that in which it is used in reference to the painter, the faculty "necessary for the production of any great work of art." Fancy a country practitioner who has had a truant patient cured by a globulist, and has retorted that he or she was relieved only by the Imagination, being informed that it was by the "power of prophecy;" that the method so far from being contemptible, was "altogether divine," and, in short, the "grandest mechanical power," belonging to man's intelligence! The only point in which he could agree with Mr. Ruskin would be that it was, indeed, "altogether inexplicable."

This eloquent writer's distinction between Fancy and Imagination is, however, too fine to be omitted. The former he characterises as "one of the hardest-hearted of the mental faculties, or, rather, one of the most purely and simply intellectual. Fancy is never serious; Imagination cannot but be serious. Imagination is quiet; Fancy restless." It is with him almost identical with simple conception, for he says "it sees the outside and is able to give a portrait of the outside, clear, and full of detail;" while "Imagination sees the heart and inner nature," though obscure in outer detail. "Fancy plays like a squirrel, in its circular prison, and is happy; but Imagination is a pilgrim on the earth, and her home is in heaven" (xii, vol. ii). Clearly, however, from a practical

medical standpoint, Fancy and Imagination are to be used synonymously.

Returning, now, to the basis of the Imagination, simple *imaging*—for, as we have said, the fundamental element is a psychical representative image—we are concerned with what are ordinarily called ideas which the mind conceives, and which may or may not be actual copies of reproductions of external objects. With ideas as they arise simply from the perception of impressions on the senses, we have not now to deal. As James Mill observes, it is an inconvenience that the word Idea is used with so much latitude of meaning; and, with him, when we employ the term “Ideation” we do so as a general term opposed to Sensation. As sensation may be intensified by various favouring circumstances, so, also, may ideation or imaging acquire intensity from Attention, Desire, Faith, &c., and then we have Imagination in its complex as distinguished from its pure and simple form of imaging. Further, ideation immediately acts upon sensation, as sensation acts upon ideation; and from our present position, it is this and its influence upon motion which constitute such important facts. Mere remembrance of a sensation is, no doubt, in general, greatly inferior in intensity to the original impression on the senses; in fact, differs mainly in this particular; but, as we shall subsequently show, ideation, under certain circumstances is, in its influence on the sensorium, as powerful as anything, in the outer world, which impresses the senses; and may be really more so, because in the states referred to, there is no disturbing element to distract the attention. Mr. Bain remarks that a certain pleasing remembrance

attaches to a good dinner, but how far below the original ! We are prepared to maintain, however, that in the above-mentioned states, an ideal dinner would be as pleasing as a real one, so far as present sensation is concerned. In the example of the fictitious pill, an idea is suggested by it to the mind, which recalls the sensation experienced on a former occasion when a real pill was taken ; this central sensation (which is referred to the peripheral terminations of the sensory nerves of the intestines) is reflected on to the motor nerves supplying the muscular walls of the alimentary canal, and they contract in consequence. It is true that in *most* instances, the effect produced would not be so sure, or so great, as when the action of the intestinal muscles is directly excited by purgatives. If, however, the system be placed under the influence of Braidism, the action excited from the centre would be more likely to equal, in intensity, that excited at the periphery.

The various ways in which vomiting may be excited, will serve to illustrate the influence of ideas presented in different forms. See how the causes differ. First, a man may vomit from taking an emetic, from a bad smell, or from visceral disease. With this class of cases we have nothing to do ; the mind has not influenced the body. Secondly, he may vomit from receiving unpleasant intelligence. Thirdly, by seeing or hearing another person retch ; from Sympathy as we say. Lastly, this effect may be induced by the belief that an emetic has been taken ; from Imagination, in the ordinary sense of the term current among men. In the second instance, the proximate cause is emotional in character, and does not

fall under the present division. In the two succeeding examples, the observations already made as to simple ideas, and ideas around which cluster other mental principles, as Expectation and Belief, so as to form a complex state popularly known as Fancy or Imagination, receive as good an exemplification as we could desire. Belief in an event about to happen was absent in the third, and present in the fourth illustration. How much the effect of even disagreeable things depends upon our knowing that they are so, is shown in everyday experience; and the cause is referred by general consent to the Imagination.

“There may be in the cup
 A spider steep'd, and one may drink, depart,
 And yet partake no venom; *for his knowledge*
Is not infected; but if one present
 The abhorr'd ingredient to his eye, make known
 How he hath drunk, he cracks his gorge, his sides,
 With violent hefts:—I have drunk and seen the spider!”
 (*Winter's Tale*, II, i.)

Lord Bacon, in his ‘Natural History,’ has a section entitled “Experiments in consort touching the emission of immaterial Virtues from the Minds and Spirits of Men, either by Affections, or by Imaginations, or by other impressions,” in which, among a good deal that is fanciful, there are several characteristically acute observations. He defines Imagination as “the re-presentation of an individual thought,” and says it is of three kinds; the *first*, joined with belief of that which is to come; the *second*, with memory of that which is past; the *third*, is of things present, or as if they were present. Of these,

the first answers to what we have spoken of as Expectation (or Expectant Attention) ; the second may be illustrated by the effect of the remembrance of a delicious peach in making the mouth water ; the third has reference merely to fanciful representation.

The power of the Imagination, Bacon also considered under three heads ; first, that exercised upon the body of the imaginant ; the second, upon dead bodies, as plants and metals ; the third, upon the spirits of men and living creatures. Of these, the first alone is embraced by our survey. Bacon it may be added, oppressed by the difficulties of the investigation, complains that " the inquisition of this subject in our way, which is by induction, is *wonderful hard!*"

The intensity of Ideas is, as we have said, greatly increased by the belief, faith, or expectation that certain phenomena will occur, and powerfully affects the body for good or ill, according as it is associated with Hope or Fear. Indeed, Hope is usually involved in medical Faith ; Fear is not. Both are frequently allied with Expectation and Belief. Expectation is a belief in the future ; if of a favorable character, it constitutes Hope ; if unfavorable Fear. Hope and fear, according to Wundt, are special forms of Expectation, containing an element of the indeterminate ; Hope is the expectation of a wished-for event ; Fear, the expectation of one not wished for. It is an apt description of this, that Expectation is the hurrying forward of the thoughts into the future. There may be the expectation of a muscular movement, or of a sensation, or that certain organic changes in the direction of health or disease will occur. As the influence of ideas

is so largely determined by their hopeful or fearful character, the emotional element will constantly crop up in the consideration of the Imagination, just as under the head of emotional influence, the illustrations of the effects of Fear must also represent Expectation, seeing that Fear is the apprehension of evil. Bain, who defines the primordial form of Belief as expectation of some contingent future about to follow on our action, holds that James Mill erred, in common with most metaphysicians, in calling it a purely intellectual state. On the other hand, the distinctive character of the belief, from an intellectual point of view, must not be lost sight of, for it is not simply that a fearful Belief will affect the bodily functions, but that the expectation of the form which it will take, will determine, more or less definitely, the particular character of the affection.

When Belief is intense we say there is Confidence; Doubt is excluded and Faith is all powerful. The Imagination has risen from a mere idea, image, or conception, to an irresistible conviction; the very mental condition which from a medico-psychological point of view, is the *desideratum*, in undertaking the treatment of diseases admitting of amelioration from the psychical method. The word Imagination is sometimes employed in too comprehensive and lax a way, and the emotions are made to enter into its composition to an unwarrantable extent. This is, perhaps, more particularly the case when its evil rather than its beneficial aspect is dwelt upon. The old French Commission on Animal Magnetism, for example, observe, "As to the Imagination, we know the derangement which a vivid and sudden impression has

often occasioned in the human machinery. The Imagination renews or suspends the animal functions; it animates by Hope or freezes by Fear; in a single night it turns the hair white; in a moment it restores the use of the limbs or the speech; it destroys or develops the germ of diseases; it even causes death."

There are two terms frequently made use of to which it will be convenient to refer here—Sympathy and Imitation.

Fundamentally identical, the former, both in etymology and usage, refers especially to Feeling, while the latter is employed in relation to Action. There is the sympathy with both forms of Feeling—the mental and the sensational. The influence upon sensation of a mind *en rapport* with another mind illustrates both effects. One who sympathises strongly with another who is suffering from bodily pain, is very likely to experience it himself. The emotional element usually enters strongly into this condition, but there may be what is termed sympathetic pain, when the knowledge, abstract idea, or conception is alone sufficient to induce corresponding bodily sensations, without any excitement of emotional sympathy. At this point it really merges into Imitation. For with both it is this knowledge or apprehension of another person's state which, more or less involuntarily, causes similar actions, as expression, gesture, and the tone of the voice. A vivid image of a phenomenon occurring to another is formed in the mind. This is reproduced in the spectator. The event is in accordance with the general law now under consideration. If John gapes when he sees Thomas gape, it is because the idea is forcibly

presented to his mind, and thus produces analogous acts. The idea is in this case excited through the senses of sight or of hearing ; but it may be suggested in other ways, as when John simply thinks of the act and the same effect is produced, as has happened to myself from writing this sentence. Here we meet the additional principle, that whatever mental or bodily state can be excited through the senses from without, may arise from within, from Imagination proper. All these sympathies come into play when we only imagine ourselves, as well as when we are really, acting on the stage of life. It is this principle, well known to psychologists, but so often overlooked by the public, which continually turns up in the consideration of the questions now engaging our attention ; and both principles united serve to form a clue to many, otherwise inexplicable, bodily manifestations, the effects of mental states. Imitation is closely allied with phenomena popularly referred to the Imagination ; with those astonishing psychological dramas which have at various epochs arrested the attention of the world. To this remarkable principle of our nature which leads us to act involuntarily like others, the convulsions and faintings, which, in sensitive persons, follow the witnessing of these conditions, are due. As regards the Imagination and Imitation, while so closely allied from this point of view, the philosopher sees in these states antagonism rather than relationship. He perceives that the Imagination expands and indefinitely extends the objects of perception or thought ; while Imitation merely reproduces and is limited by the boundaries of actual facts. The Imagination, if it does not create,

combines old forms until new ones arise; the Imitative faculty does not invent, it only copies. They bear, in this aspect, the same relation to each other that the painter and the engraver do. Both are essential to the well-being of the individual and the community. Without Imagination the world would be a desert, devoid of even its mirage; a barren present without future hopes. Without Imagination the lover and the poet, according to a high authority, could not exist. Without Imitation the child could not grow into the man. Without Imitation the acts of daily life, known as "habits" originating in unconscious mimicry and heredity would be fresh inventions or discoveries in each individual. From our present practical standpoint however, Imitation is rather the result of an idea excited by sensorial impressions or the imagination. It involves a reflection or bodily counterpart of a mental image. When people say that a hysterical girl has her imagination vividly impressed by the contortions of a patient, and becomes similarly affected, the psychologist affirms that a vivid image was excited in the mind, and that, by the law already laid down in regard to Imitation or Sympathy, the spectator's body assumes the same state as that of the patient. The physiologist's mode of expressing the like event, is that the idea excited by the scene passed from the hemispheres down to the motor ganglia and nerves, and so a corresponding ideomotor act resulted.

In concluding this Section it may render the relation between Sensation and Ideation clearer to employ a familiar illustration. I perceive an object, the sun, for example. An image is formed on the retina, which is

transmitted by the optic nerves to the brain. These processes ensure sensorial perception, or object-consciousness. But there is more than this ; there is a mental impression, involving subject-consciousness. The condition of my mind when I perceive the sun, may be considered to involve ideational as well as (though excited by) sensorial changes ; including, in short, the mental state, which, as an idea, remains after the external object or stimulus is withdrawn. A change has been induced in the grey matter of the hemispheres by the upward action of the sensory ganglia excited by impressions from without, so that we have three distinct though continuous portions of the nervous system acted upon ; the peripheral expansion of the optic nerve on the retina, the corpora quadrigemina, and the hemispherical centres.

After ceasing to perceive the sun, I retain, then (apart of course from the spectrum which may remain for a short time after closing my eyes), a state of mind in relation to it which constitutes an idea—the immediate result of an external object, one which passing away from the consciousness may become latent. This by active Memory or recollective Imagination may be recalled, or by creative Imagination may be united with other ideas and formed into one mental image. The vexed question of the nature of the recollection of sensations, in idea, will be referred to in the next Chapter.

CHAPTER II

INFLUENCE OF THE INTELLECT ON SENSATION

SECTION I.—Æsthesia

THE Intellect may excite ordinary Sensation (æsthesia), which in addition may be either excessive (hyper-æsthesia) or diminished (anæsthesia), while it may also induce perverted sensation (paræsthesia), which when painful, constitutes dysæsthesia.

The terse, but comprehensive expression of John Hunter, which has already been cited, contains in a nutshell the principle which underlies the greater part of the phenomena referred to in this Chapter. "*I am confident that I can fix my attention to any part until I have a sensation in that part.*" Müller expresses the influence of the ideational upon the sensational centres in equally clear terms. "Ideas do not act merely on the motor apparatus by which they are expressed ; they as frequently affect the organs of sense, which then present sensorial impressions or images of the ideas." Among other proofs he gives the instance of a person's teeth being set on edge by witnessing another about to pass a sharp instrument over glass or porcelain ; also the production of shuddering by the mention-

ing of objects which, if present, would excite that sensation; that is, by recollective Imagination. "I cannot think of seeing a slate rubbed with a dry sponge," remarks Herbert Spencer, "without there running through me the same thrill that actually seeing it produces." The idea of a piece of blanket in the mouth affects one of my friends in a similar but more remarked way.

If twenty persons direct their attention to their little fingers for five or ten minutes, the result will be something like this: A few will be unconscious of any sensation in this member; some will experience decided sensations—aching, pain (*dysæsthesia*), throbbing (*hyperæsthesia*), &c.; and the majority will feel a slight sense of weight (*æsthesia*) and tingling (*paræsthesia*). This simple experiment raises several questions, as, Might sensations always be felt in the part from the changes which are constantly going forward in the tissues, but are unobserved except when the attention is directed to them? Or, does the act of Attention excite increased vascularity of the sensory ganglia and cause subjective sensations? Or, lastly, do the sympathetic centres become excited, and the vaso-motor nerves influenced, so as to cause temporary vascular changes in the finger which involve sensation? The first supposition does not seem probable, except to a very slight extent. If correct, we should always feel some sensation in the finger when consciousness is directed towards it. We think both the remaining suppositions have weight. Probably the feeling experienced is partially subjective; but we believe there is a real effect produced upon the finger if Thought is sufficiently long directed to it, and that these vascular changes

are felt in the form of throbbing, weight, &c.* Other changes are more likely to be subjective.

Mr. Braid tells us in his little book on 'Hypnotism' (xx, p. 93) that he requested four gentlemen, in good health, and from 40 to 56 years of age, to lay their arms on a table with the palms of their hands upwards. Each was to look at the palm of his hand for a few minutes with fixed attention, and watch the result. Entire silence was enjoined. What happened? "In about five minutes, the first, one of the present members of the Royal Academy, stated that he felt a sensation of *great cold* in the hand; another, who is a very talented author, said that for some time he thought nothing was going to happen, but at last a *darting, pricking*, sensation took place from the palm of the hand, as if electric sparks were being drawn from it; the third gentleman, lately mayor of a large borough, said that he felt a very uncomfortable sensation of heat come over his hand; the fourth, secretary to an important association, had become rigidly cataleptic, his arm being firmly fixed to the table."

It would be difficult to determine in these instances by what train of thought these different results came to pass; whether each imagined that such and such effects would be produced by the process, or whether an accidental condition of the hand at the moment, caused certain very slight suggestions, which were intensified

* This view is confirmed by the fact that if a part which is the object of close attention is held firmly in one position, the display of muscular energy is accompanied by vaso-motor dilatation in this portion of the body (see Gaskell in the 'Journal of Anatomy and Physiology,' xi (1877), p. 720).

by the Attention directed to them. Probably the former ; but one thing is certain, that had Mr. Braid suggested other effects, instead of preserving silence, the character of the sensations would have been greatly modified.

SECTION II.—Hyperæsthesia

It is unnecessary, under this head, to do more than to refer in illustration to the notorious fact that the expectation of the pain of an actual blow on any part of the body greatly intensifies it. It is, in short, the converse of the other truth that pain is not felt or only slightly felt, when the attention is directed in a different channel.

SECTION III.—Anæsthesia

Insensibility to bodily pain, artificially induced, without drugs and solely by psychical means, is a most interesting and important fact, and would require a chapter instead of a few paragraphs to do it justice.

The simplest example of anæsthesia due to intellectual conditions, occurs when the Attention is so powerfully arrested in a certain channel that the application of a painful stimulus to the body is not observed. The writer was on one occasion about to have a tooth extracted under the influence of laughing gas, when, in consequence of an unlooked for *contretemps*, the dentist was unable to administer it. The extraction was therefore performed without it, but the operation was rendered almost painless, by the writer vividly imagining pleasant ideas, and

mentally repeating to himself "How delightful! how delightful!"

In January, 1883, there was a young woman, Elizabeth H—, a patient at Guy's Hospital, who was found by the house-physician, Mr Price, to be readily susceptible to the effects produced by directing her attention for a few minutes to a bright object. In this state I found that any part of the limbs became anæsthetic or sensitive according to the idea impressed upon her. When we pricked her arm with a pin she did not in the first instance indicate any sense of pain, but when we impressed upon her mind that the pricking was painful she manifested the usual indications of pain. When, on the contrary, the idea was immediately impressed upon her that the proceedings would not hurt her, the part pricked was at once entirely anæsthetic. This experiment was repeated several times. She had no recollection of it when aroused.

A young lady, who was about to be operated upon by Mr J. G. Thrupp under the influence of ether, fell into a condition simulating the effects of etherisation. Three and a half years before, ether had been administered to her, on account of the removal of teeth, and previous to the return of sensibility she laughed and cried in a hysterical manner. On November 30, 1882, Mr Thrupp held for a second or two some ether about three inches from the patient's mouth. Scarcely had she recognised the smell than the eyelids quivered rapidly, there was convergent strabismus, the face became congested and assumed the purple hue common in the early stage of anæsthesia. Violent trembling of the upper and

lower limbs followed, succeeded by strong convulsive struggles, and at last complete flaccidity of the muscles, with heavy breathing. The sensibility was blunted, so that the edge of the upper eyelids could be touched without inducing reflex action* (xlvii, December 23, 1882).

I am indebted to Mr Woodhouse Braine, who has had large experience in administering anæsthetics at the Charing Cross Hospital, for the following striking cases of imaginary or psychical anæsthesia.

"During the year 1862 I was called upon," writes Mr Woodhouse Braine, "to give chloroform to a very nervous and highly hysterical girl, who was about to have two sebaceous tumours of the scalp removed. On going into the operating theatre, it was found that the bottle containing the chloroform had been removed to the dispensary, and on testing the Snow's inhaler, which at that time I was in the habit of using, I found it to be quite devoid of even any smell of chloroform. Then having sent for the bottle in order to accustom the girl to the face-piece, I applied it to her face and she at once began to breathe rapidly through it. When she had done this for about half a minute she said, "Oh, I feel it, I feel I am going off," and as the chloroform bottle had not arrived, she was told to go on breathing quietly. At this time her hand which had been resting across her chest slipped down by her side and as she did not replace it, I thought I would pinch her arm gently to see the amount

* When ether was actually administered, the patient became sensible, and insensibility was with difficulty re-induced with seven ounces of ether. It seems a pity not to have operated during the continuance of the mental anæsthesia.

of discomfort her hysterical state would induce her to bear. She did not notice a gentle pinch and so I pinched her harder, and then as hard as I could, and to my surprise I found that she did not seem to feel at all. Finding this was the case I asked the operator to begin and he incised one of the tumours, and then as the cyst was only slightly adherent, pulled it away. At this time I had removed the face-piece and wishing to see the effect of her imagination, I said to the operator, who was going to remove the second tumour, "wait a minute, she seems to be coming round." Instantly her respiration which had been quite quiet, altered in character, becoming rapid as when I first applied the inhaler, and she commenced moving her arms about. I then reapplied the face-piece and her breathing again became quiet, and she submitted to the second operation, without moving a muscle, and when the water dressing and bandages were applied, in answer to the question, as to whether she had felt anything, she said, "No I was quite unconscious of all that was done," and to the time she left the hospital she firmly believed in the potency of the anæsthetic which had been administered!

"Exactly ten years later, that is in 1872, I met with a similar case. On June 16, 1872, Kate Levy, aged 20, came to the Dental Hospital of London to have some carious teeth extracted, but as more than one sitting was deemed necessary, it was proposed to remove the two most painful and difficult teeth, and then order her to come again. This patient like the last was of a very hysterical temperament, but had nitrous oxide administered without any difficulty, and the extractions were

performed ; when she came to herself, she refused to sit up in the chair, or to push the piece of wood from between her teeth, (where it had been placed for the purpose of keeping her mouth open), that is, she remained perfectly motionless, not taking any notice of surrounding objects, and not doing anything she was told to do. That she was conscious I knew by the expression of her face, by the quivering of both eyelids, and by the reflex action which immediately ensued on touching the conjunctiva. I therefore said to the operator, "Well, if she is still unconscious there will be time to remove another tooth," for eleven teeth and roots had to be extracted, and to my surprise this was done without any apparent suffering. I then remembered the previous case and said to the operator "Now she is coming round." She thereupon opened her eyes, sat up and recovered in the usual way that patients do. She came again on June 21st, and wishing to try the influence her imagination had on her sensibility, I determined to administer air only. She breathed this for a few seconds, and on my calling the pupils' attention to her mode of quiet breathing, she began to inhale the air more deeply, and then on my giving her the cue by saying to the pupils present, "Now you see, when I lift up her hand, and then let it go, it will fall heavily," it turned out as was predicted ; then saying, "Now you will find she will breathe rapidly and then cease to feel pain, although she will know something is being done," I removed the face-piece. The operator then commenced his extractions, removed four teeth, and in the hospital note-book it is written by Mr T. H. G. Harding, who was the surgeon on duty that day : 'Note :—The

patient breathed air only through the inhaler ; one firm tooth, two firm stumps, and a temporary tooth extracted ; said she felt no pain, but felt the teeth coming out—a well-marked case of hysteria. H. H.' This patient again came by order on June 29th, and on several other occasions, when air only was administered, and each time the same psychical anæsthesia was apparent."

No one who has studied the history of anæsthetics* in all forms, doubts that, whether by inducing a profound and peculiar kind of sleep, or by merely rendering the patient insensible to sensorial impressions related to a certain idea or train of ideas, severe as well as trivial operations may be performed without any pain. A few words on anæsthesia, especially in connection with Dr Elliotson and Mesmerism, may not be out of place here.† A passage in Sir John Forbes's 'British and Foreign Medical Review,' on its employment in surgical operations, is now of real historical interest, and the period which it marks ought not to be overlooked by any one who undertakes to write a complete history of anæsthetics. Four years before (in 1842) at a discussion at the Medical and Chirurgical Society, on an operation performed without pain under the influence of Mesmerism (so-called), a distinguished member of the profession, the late Dr

* It is a remarkable fact that in all, or nearly all histories of anæsthetics, *psychical* anæsthetics are not even mentioned. Yet they preceded drug-anæsthesia, and to a large extent suggested it. Cloquet removed a woman's breast, during the mesmeric sleep (she being able to converse, but insensible to pain), so far back as 1829. It is said that no fatal case from psychical anæsthesia has occurred.

† *Vide* Remarks by the writer on the occasion of Dr. Elliotson's death, in the 'Medical Times and Gazette,' August 29, 1868.

Copland, asserted that the fact was unworthy of the Society's consideration, because pain is a wise provision of nature, and patients are all the better for it, and recover more quickly !

In 1843 appeared Dr Elliotson's well-known work, 'Numerous Cases of Surgical Operations without Pain in the Mesmeric State.' Then after the lapse of a few years, a large number of capital operations in various countries (especially in India by Dr Esdaile) having been painlessly performed, a considerable change of opinion evidently took place, and Sir John Forbes, in his 'Review' for Oct., 1846, thus writes :—"Indeed, we hesitate not to assert that the testimony is now of so varied and extensive a kind, so strong, and, in a certain proportion of cases, so seemingly unexceptionable, as to authorise us—nay, in honesty to compel us—to recommend that an immediate and complete trial of the practice be made in surgical cases." But scarcely had this number of the 'Review' appeared, when the first operation under the influence of ether was performed in America ! This was on October 16th, and the news reaching England on December 17th, the discovery was announced in the 'Medical Gazette' of the 18th, under the head of "Animal Magnetism Superseded," and on the following day Liston operated for the first time upon a patient under its influence. It was soon seen that many phenomena, such as partial consciousness, calling out as if in pain, and sensitiveness to slight touch, were quite consistent with perfect insensibility to pain (analgesia) and were not, as many had supposed when they occurred in mesmeric patients, proofs of imposture. Now, Dr Elliotson and

his opponents were both right and wrong—he wrong in asserting that Mesmerism would be the anæsthetic ultimately adopted by the profession, but right in his belief that operations had been painlessly performed under its influence ; however its mode of action be explained. We can but smile now at the objection already referred to, raised with so much flippancy against the prevention of pain ; possibly we ought rather to blush that members of our profession should, on this ground, have opposed the noble attempt to introduce painless operation in surgery. Perhaps the prejudice was not more singular than that of the esteemed Editor of ‘*Chelius*’ against the employment of ether, for he wrote, in 1847, “I have considerable doubt of the propriety of putting a patient into so unnatural a condition as results from inhaling ether, which seems scarcely different from severe intoxication, a state in which no surgeon would be desirous of having a patient who was about to be submitted to a serious operation ” (lxii, II, p. 1009).

The Marquis of Dalhousie wrote in 1856, June 27, in reference to Esdaile’s psychical anæsthetic : “Of the efficacy of it in surgical cases I am able to speak with confidence. Dr Esdaile undoubtedly did possess the faculty of so influencing the sensations of natives of India by means of mesmerism as to reduce them to a state of insensibility not less complete than that which is now produced by the use of chloroform. While they were in that state of insensibility he performed upon them surgical operations of every kind ; many of them tremendous in their magnitude, duration, and severity. Those operations were performed without any apparent consciousness in the

patient, without pain to him, and usually with great success."*

Dr Esdaile, in his 'Introduction of Mesmerism (with the sanction of the Government) into the public hospitals of India' (2nd edit. 1856), records 261 operations performed by him in the hospitals of Hooghly and Calcutta, rendered painless by mesmerism. Of these, 200 consisted of the removal of large tumours from 10 lbs. to 103 lbs. weight. In a hospital called the Subscription Hospital there had also been eighty-four capital operations performed under the same influence. In addition to these 345 operations, smaller ones were performed, as teeth extraction, application of nitric acid to large wounds, abscesses opened, &c.

There were 14 deaths out of 261, but in no instance was death caused by the operation.

SECTION IV.—Paræsthesia

The individual under the influence of Braidism persuaded that he is in danger of being lost in the snow, shivers with imaginary, but to him no less real, cold. Adopting the expression which the Tichborne trial has rendered so proverbial, we may say that Shakespeare would have been "surprised to learn" that a man might be able to hold a fire in his hand and yet fancy himself

* Lord Dalhousie states that he appointed Dr Esdaile in 1848 to be one of the Presidency Surgeons in acknowledgment of the services he had rendered to humanity, and in order that he might be able to continue his services at the capital (Calcutta).

cold by thinking on the frosty Caucasus, and, conversely, might be able without feeling chilly to

“Wallow naked in December snow,
By thinking on fantastic summer's heat ;

for a central sensation of ideal or subjective origin, can supplant the sensation derived from a peripheral impression, since the antithesis suggested (being more powerful in proportion to the original stimulus) would occupy that portion of the cortex habitually connected with simple sensation and thus a kind of local hypnotism result.

Professor Gregory reports one of those frequent cases in which, by suggestion, “the subject” experiences a variety of sensations. “One arm was deprived of sensation, or both arms, or the whole frame. He was made to feel a knife burning-hot, and the chair on which he sat equally so. When he started up he was made to feel the floor so hot that he was compelled to hop about, and wished to pull off his boots, which burnt him. He was made to feel the room intolerably warm, and actually perspired with the heat ; after which he was made to feel it so cold, that in a minute or two he buttoned his coat, and walked about rubbing his hands. In about five minutes his hand was really chilled, as I found, like that of a person exposed to frost” (xix, p. 353).

Mr Braid in investigating the alleged discoveries of Reichenbach in regard to the Od force, found that in nearly all cases, even when the persons had not been hypnotised, drawing a magnet or other object slowly from the wrist to the point of the fingers produced various effects. Among these were “a change of temperature,

tingling, creeping, pricking," while, when he reversed the motion, "it was generally followed by a change of symptoms *from the altered current of ideas then suggested*. Moreover, if any idea of what might be expected existed in the mind previously, or was suggested orally during the process, it was generally very speedily realised. The above patients being now requested to look aside, or a screen having been interposed so as to prevent their seeing what was being done, if they were requested to describe their sensations during the repetition of the processes, similar phenomena were stated to be realised when there was nothing whatever done beyond watching them, and noting their responses." His son, Dr Braid, who assisted his father in his experiments, remarks in a letter to the author a few years ago, "certainly the first results would have misled any one who was not accustomed to sift such matters."

When visiting the Crystal Palace some years ago, it struck the writer that the man who then had charge of a galvanic battery, could tell something about Imagination. I was not mistaken, for he assured me that very often when a lady had grasped the handles of the machine, she remarked on the peculiar sensations she experienced, and quite thought she was being galvanised, although he had not put the battery in action. But it is a fact, perhaps equally deserving of notice, that such subjective impressions may, as in the present instance, have a limit to their operations, for the galvanist stated that he had never observed any twitching of the hands from these imaginary shocks.

The thought of any material which actually sets "the

teeth on edge" may cause this or allied sensations* of discomfort and even muscular movements. Of course the sensitiveness to particular things, in consequence of heredity or of an individual and accidental association of a particular surface with certain sensations, varies greatly. The mere recalling of the fruit must have induced decided sensations in such a family as that mentioned by Prosper Lucas, to the members of which the mere sight of a peach was intolerable, producing "une sensation de frémissement interne et d'horripilation." Hence it was necessary to prepare their peaches for them with the skin carefully removed. (Vide 'Traité Philosophique et Physiologique de l'Hérédité Naturelle,' i, 481.)

SECTION V.—Dysæsthesia

Then as to actual pain caused by mental states, Sympathy, Expectation, &c., the most familiar instance is that of toothache, or *tic-doloureux* occasioned in this manner. Burton quotes from Dr Cotta's 'Discovery of Ignorant Practitioners of Physick' two examples of what "Phansie is able to do; the one of a parson's wife in Northamptonshire, anno 1607, that coming to a physician, and told by him that she was troubled with the *sciatica*, as he conjectured (a disease she was free from), the same night after her return, upon his words, fell into a grievous fit of a *sciatica*; and such another example he hath of another good wife, that was so troubled with the *cramp*; after the same manner she came by it, because her physician did but name it" (xlvi, p. 169).

* See pages 33-4.

Lauzanus records the case of a young man who watched with great attention a priest being bled from the arm for an attack of pleurisy. Two hours afterwards he experienced a severe pain in his own arm, at the spot corresponding to that of the puncture, and did not get rid of it for a couple of days (lx, p. 154). This is a fair instance of the primarily neuralgic class of cases, caused by a stimulus acting centrally upon the sensory nerves. In this and the following case it is impossible to say how far emotional excitement assisted the result.

Gratiolet (xv) relates that a law student who was present for the first time in his life at a surgical operation, which consisted in removing a small tumour from the ear, felt at the same instant so acute a pain in his own ear that he involuntarily put his hand to it and cried out. Gratiolet, who himself witnessed the circumstance, does not state whether the affected ear corresponded to that upon which the operation was performed, but this it implied. This case forms an excellent illustration of simple pain caused by what is popularly understood as "Sympathy," a fellow feeling, which might well bring it under the category of emotional influence.

SECTION VI.—Sensation from Association of Ideas in accordance with the Law of Contiguity

Instances abound of physical effects resulting from the operation of this law. A man, at a previous period has had the same idea presented to his mind as that now present, and with it there was associated a particular

sensation. With the recurrence of the idea arises the formerly associated sensation, unless the latter has been too faint to induce the necessary cohesion or "polarization."

Dr Kellogg records, in the 'American Journal of Insanity,' the case of a friend of his who informed him that he had frequently sailed when young in a steamboat across an arm of the sea which was rough, and in consequence often suffered from sea-sickness. Upon this boat was an old blind fiddler who did his best to alleviate the sufferings of the passengers with his violin. The result was that this instrument became associated in his mind with sea-sickness, and for years he could never hear it without experiencing sensations of nausea or a sort of *mal de mer*. Van Swieten's case of vomiting, which will be given under involuntary muscular action, might also be, as correctly, cited here.

Gratiolet (xv, p. 297) relates of himself that when a child his sight became affected, and he was obliged to wear spectacles. The pressure which their weight exerted upon the nose was so insupportable that he was obliged to discontinue their use. Writing twenty years after, he says that he never sees any one wearing spectacles, without instantly experiencing, very disagreeably, the sensation which had so much disturbed him as a boy.

Mr J. W. Clark, formerly of the Royal Indian Engineering College (Staines), informs me that he was severely burnt in consequence of an explosion in a hot oil bath. Ever since the accident, now some years ago, the smell of hot oil has always been productive of a feeling of nausea. A slight burn from ether vapour (also about

the head) caused a similar though much less marked sensation to become associated with it.

SECTION VII.—Special Senses

In regard to the *special senses*, the influence of the Mind is notorious. If any one prefers to consider the senses under the term Mind, he has but to suppose that we are illustrating the influence of one group of mental faculties over another group, instead of that of Mind over Body. All we maintain is that the psychical state—the condition of the cerebral hemispheres—may play upon the sensory centres so as to produce certain sensorial phenomena, and also that it may so affect the sensorium that impressions upon the senses received from the outer world may be modified in various ways. We cannot adopt Hunter's mode of expression "the idea of a sensation is supposed to be the sensation itself," for there is a sensation, although subjective. When there is actual hallucination, we may say that the idea of a sensation, having induced such intensity of action of the sense-ganglia as to cause the same effect as if excited by a material object, is supposed to be a sensation caused by an objective impression.

(a) *Olfactory*.—The influence of the Imagination (in its expective form) upon the olfactory sense is well exhibited in a case reported by Professor Bennett, of Edinburgh (xviii, p. 15):

"A clergyman told me that some time ago suspicions were entertained in his parish of a woman who was supposed to have poisoned her newly born infant. The

coffin was exhumed, and the procurator fiscal, who attended with the medical men to examine the body, declared that he already perceived the odour of decomposition, which made him feel faint, and in consequence he withdrew. But on opening the coffin, it was found to be empty, and it was afterwards ascertained that no child had been born, and consequently no murder committed."

(b) *Ocular*.—There is a striking observation made by St. Theresa, whom M. Maury characterises as the metaphysician of feminine mysticism and of ecstatic illumination; namely, "I have known some of weak mind who imagine they *see* all that they *think*, and this," she adds "is a very dangerous condition." One practical reflection may, in passing, be made upon the ecstasies to whom she refers. It would be much more difficult to believe in the credulity of the saints and mystics, if we did not see ample physiological reasons for believing that the senses were really acted upon by their intense thought on certain spiritual subjects. They knew nothing of the action of Expectation or Imagination upon the sensorium.

In cases where actual visions are described as occurring, while we do not think it necessary to assume more than an excitement of the sensory ganglia, Müller would have held that there was an image impressed on the retina excited by internal instead of, as normally happens, by external stimuli.* In his section on the "Influence of

* Müller says, "The process by which phantasms are produced is the reverse of that to which the vision of actual external objects is due. In the latter case particles of the retina thrown into an active state by external impressions, are conceived in that condition

the Mind upon the Senses," he objects to the term hallucination being applied to such experience, because it implies that the phantasm is a mere idea, instead of being truly a sensation. This objection is, of course, equally forcible whether we regard the retina (in the case of vision) or the optic centres, as the seat of the phenomenon.

Müller's remark, when referring to those cases in which extirpation of the eye co-exists with phantasms, that they "prove that the presence of the retina is not a necessary condition for the production of such phenomena, but, on the contrary, that the deeper seated parts of the essential organ of vision are alone required" is an admission sufficient to allow of all other instances of spectral phenomena from subjective causes being referred to the sensory ganglia and central nuclei of the optic nerve.

Unusually vivid sensations from external objects occasioned by cerebral excitement at the time will, as we have frequent proofs, remain, or be easily recalled, long after the original impression was received. This was strikingly shown in the experience of one of the survivors of the unfortunate "London." When escaping from the wreck, in the boat, he would sometimes be baling out the water and half asleep at the same time. When in this state he could always see a vessel before him with

by the sensorium; in the former case, the idea in the sensorium excites the active state of corresponding particles of the retina or optic nerve" (iii, p. 1391). He adds that the action of an idea upon the organ of vision, so as to produce a corresponding sensation (spectre) is not more remarkable than the ordinary function of sight by which an idea of an object is produced.

her stern under water, her jibboom and foretopmast gone, and her foresail flapping in the wind. "It was the 'London' as she last appeared to me. At any time, during the night if I were to close my eyes, if only for a second, the ship was always before me *in this form*." And after being picked up by the barque next day, and able to have some sleep, he says, "and a troubled sleep it was. I passed through all the horrors of another shipwreck; and for many nights after, and I may say many weeks after, I had to go through the same ordeal." The intensity of the impression derived from witnessing the shipwreck impressed so vivid an image on the optic perceptive centre that whether sleeping or waking, there was a constant flow of energy from the sensory to the ideational centres of the cortex.

The simplest example, perhaps, which can be adduced of the influence of Attention upon the sensory ganglia, is the act of recalling a visual impression, even after a long interval of time. Thus, Sir Isaac Newton, in a letter to Locke (xxxix, I, p. 40), describes how he once looked a short time at the sun in a mirror, and then turned his eyes into a dark corner of his room till the spectrum vanished, repeating the experiment three times. The third time he found to his amazement, when the light and colours were almost gone, that they began to return "by intending his fancy upon them," and became as vivid as when he had just looked at the sun, but if he ceased "to intend his fancy" upon them, they vanished again. "After this," he says, "I found that so often as I went into the dark and intended my mind upon them, as when a man looks earnestly to see anything

which is difficult to be seen, I could make the phantasm return without looking any more upon the sun, and the oftener I made it return, the more easily I could make it return again." At last he brought his eyes "to such a pass" that he had to shut himself up in a dark room for three days together "to divert my Imagination from the sun; for if I thought upon him I presently saw his picture though I was in the dark." By this method, and employing his mind about other things he began in a few days to have some use of his eyes again. Yet for some months after, "the spectrum of the sun began to return as often as I began to meditate upon the phenomena even though I lay in bed at midnight, with my curtains drawn." When Newton wrote this interesting account to Locke, he said he had been several years very well, but he thought that he could recall the spectrum "by the power of his Fancy," if he durst try. He adds, that such an occurrence involves a question "about the power of Fancy," which he confesses is "too hard a knot for me to untie," but inclines to refer it to "a disposition of the sensorium to move the Imagination strongly, and to be easily moved, both by the Imagination and by the light, as often as bright objects were looked upon." Another remarkable observation was made by Newton in this case. He had only looked at the sun (in the mirror) with his right eye, yet he found that "my Fancy began to make an impression on my left eye as well as upon my right," and he could see the spectrum of the sun if he did but intend his Fancy a little while upon it. So that here the powerful direction of Thought or Attention produced the same effect on the left eye, or a point in the

corresponding optic perceptive centre, as that of the sun itself upon the right eye.

The following, related by Sir B. Brodie, is a case in point :—

“ A gentleman of my acquaintance, of a very sensitive and imaginative turn of mind, informed me that not unfrequently when he had his thoughts intensely fixed for a considerable time on an absent or imaginary object, he had at last seen it projected on the opposite wall, though only for a brief space of time, with all the brightness and distinctness of reality ” (xxx, p. 84).

A man has his mind so far awake during sleep as to dream of a figure ; either one which has impressed his retina and sensorium, or which he never saw, and is the product of his Imagination. That the highest sensory centres have been in activity, as well as the lower optic ganglia is indicated by the occasional persistence of the phantom after awaking from the sleep in which the dream has occurred, since this necessitates memory.

The next case given by Brodie illustrates these remarks. He adduces it as a proof that in visions connected with our dreams, there is something more than what occurs in the instance of objects ordinarily presented to our minds by Memory and Imagination. What this “ more ” consists of is not decided by Brodie, and its decision must depend upon whether we hold that in the operation of these faculties the same brain-tracks (sensory centres) are excited as in the production of actual phantoms, the only difference being one of intensity ; or, that the cerebral hemispheres only are in operation. “ A friend of mine, on awaking in the morning, saw standing at the foot of his

bed a figure in a sort of Persian dress. It was as plainly to be seen, and as distinct, as the chairs and tables in the room, so that my friend was on the point of going up to it, that he might ascertain what, or rather who, it was. Looking, however, steadfastly at it, he observed that, although the figure was as plain as possible, the door behind it was plainly to be seen also, and presently the figure disappeared. Considering the matter afterwards, he recollected that he had had a dream in which the Persian figure played a conspicuous part; and thus the whole was satisfactorily explained, it being evident that the dream, as far as this part of it was concerned, had continued after he was awake, and so that the perception of the imaginary object had existed simultaneously with that of the real ones."

The physiologist Gruithuisen had a dream, "in which the principal feature was a violet flame, and which left behind it, after waking, for an appreciable duration, a complementary image of a yellow spot" (xliv, p. 144).

The remarkable power possessed by some persons of seeing visual images, especially numerals, has been worked out by Mr Galton in the most interesting manner since the first edition of this work was published. Thus, for example, Mr Bidder, Q.C., in performing extraordinary feats of mental calculation, can refer to certain visual numerals vividly depicted in his sensory centres in a definite and orderly manner. It has been found by Mr Galton that a large number of persons, about one in thirty, possess the same faculty in different degrees of power, and under different forms. Its hereditary character is strikingly exhibited in the case

of Mr Bidder, as his father, the celebrated "calculating boy," availed himself of the like numerical register to which he could direct his attention, and the son of Mr Bidder, Q.C., has a similar power—three generations in all.*

The readers of Scott's 'Demonology and Witchcraft' will remember a remarkable example of spectral illusion cited by him from Peter Walker's 'Lives,' occurring on the banks of the Clyde in 1686. In this instance a great many persons saw, while others failed to see,† companies of men in arms marching along and disappearing; also bonnets, guns, and swords. The narrator says that a gentleman near him called out "All you that do not see, say nothing; *for I persuade you, it is a matter of fact, and discernible to all that are not stone blind!*" And he proceeds, "Those who did see told what locks the guns had, and their length and wideness, and what handles the swords had, whether small or three barred, or Highland guards; and the closing knots of the bonnets, black or blue; and those who did see them there, *whenever they went abroad, saw a bonnet and a sword drop in the way*" (p. 15, Ed., 1876). He estimates the proportion who could see these objects at two thirds.

Nicolai's experience (without any suggestion from without) forms an excellent parallel, and certainly could not be explained by mirage. "I saw several

* The reader will find Mr Galton's paper on "Visualising Numerals" in 'Nature' for Jan. 15, 1880. See also his "Inquiries into Human Faculty and its development," 1883.

† Had *all* seen these figures, we should have referred the phenomenon to a mirage, but as a fact one third—the unimaginative—could see nothing.

times people on horseback, dogs, and birds. All these phantasms appeared to me in their natural size, and as distinct as if alive, exhibiting different shades of carnation in the uncovered parts, as well as in different colours and fashions in their dresses, though the colours seemed somewhat paler than in real nature. None of the figures appeared particularly terrible, comical, or disgusting, most of them being of an indifferent shape, and some having a pleasing appearance" (xxvii, vol. vi).

George Combe says, in his "Life," that when he was a boy he was present at an execution, and he observes "one incident impressed this scene very deeply in my memory. At that time boys wore round hats having a black cord outside wound round the bottom with which to contract their diameter and make them fit the head. The night of the execution was clear starlight. After dark I issued from the house for some purpose, and behold between me and the sky hung the executed criminal dangling in his black clothes, I looked twice and there he was—there could be no mistake. I uttered a scream and ran into the house as if his ghost had been pursuing me. The kitchen door was open and I flew to the light. There I saw about three inches of the black cord depending from the front of my hat having a knot on the end of it, and as this came exactly between my eyes and the sky-line, when I looked up, the appearance of the unfortunate deceased was instantly accounted for. But I passed a restless and unhappy night and it was many days before the scene faded from my mind, so as to permit tranquillity to be enjoyed during the hours of darkness."

A curious illustration of the influence of the Imagination in modifying the perceptions of sensorial impressions derived from the outer world, occurred during the conflagration at the Crystal Palace in the winter of 1866-7. When the animals were destroyed by the fire, it was supposed that the chimpanzee had succeeded in escaping from his cage. Attracted to the roof, with this expectation in full force, men saw the unhappy animal holding on to it, and writhing in agony to get astride one of the iron ribs. It need not be said that its struggles were watched by those below with breathless suspense, and, as the newspapers informed us, "with sickening dread." But there was no animal whatever there, and all this feeling was thrown away upon a tattered piece of blind so torn as to resemble, to the eye of fancy, the body, arms, and legs, of an ape!

In the following case within my own knowledge the visual illusion was clearly excited by the idea being, in the first instance, present to the mind. A lady was walking one day from Penryn to Falmouth, and her mind being at that time, or recently, occupied by the subject of drinking fountains, thought she saw in the road a newly erected fountain, and even distinguished an inscription upon it namely—

"If any man thirst, let him come unto me and drink."

Some time afterwards she mentioned the fact with pleasure to the daughters of a gentleman who was supposed to have erected it. They expressed their surprise at her statement, and assured her she must be quite mistaken. Perplexed with the contradiction between the testimony

of her senses and of those who would have been aware of the fact had it been true, and feeling that she could not have been deceived (for "seeing is believing"), she repaired to the spot and found to her astonishment that no drinking fountain was in existence—only a few scattered stones, which had formed the foundation upon which the suggestion of an expectant imagination had built the super-structure. The subject having previously occupied her attention, these sufficed to form, not only a definite erection, but one inscribed by an appropriate motto corresponding to the leading idea.

Dr Wigan's well-known experience in his own person is a case in point, and is too striking to be omitted from our *collectanea psychologica*. He was attending a *soirée* given in Paris by M. Bellart, shortly after an event which strongly excited public feeling—the execution of Marshal Ney—when the incident occurred. On the arrival of a visitor, M. Maréchal *ainé*, the usher announced Maréchal Ney. Dr Wigan says, an electric shudder ran through the company, and he owns that the resemblance of the prince was, for a moment, as perfect to his eyes, *as if it had been the reality*.

Mr Braid gives the case of a lady, above 56, who had, when young, been a somnambulist, but in perfect health and wide awake when the experiment was tried. Having been placed in a dark closet and desired to look at the poles of a powerful horse-shoe magnet and describe what she saw, she "declared, after looking a considerable time, that she saw nothing." However, after Mr Braid told her to look attentively and she would see fire come out of it, *she speedily saw sparks*, and presently it seemed to

her to burst forth, as she had witnessed an artificial representation of the volcano of Mount Vesuvius at some public gardens. Mr Braid then closed down the lid of the trunk which contained the magnet, but still the same appearances were described as visible. "By putting leading questions, and asking her to describe what she saw from *another* part of the closet (where there was nothing but bare walls), she went on describing various shades of most brilliant coruscations and flame, according to the leading questions I had put for the purpose of changing the fundamental ideas. On repeating the experiments, similar results were repeatedly realised by this patient. On taking this lady into the same closet after the magnet had been removed to another part of the house, she still perceived the same visible appearances of light and flame, when there was nothing but the bare walls to produce them; and two weeks after the magnet was removed, when she went into the closet by herself, the mere association of ideas was sufficient to cause her to realise a visible representation of the same light and flame" (xxiii). The force of this illustration would remain precisely the same, if it should be proved that a light, only visible to "sensitives," does proceed from magnets.

These instances form good illustrations of the slight influence of volition over sensation compared with that of a vivid mental image or idea acting upon the sensorial centres, and distorting or moulding in other forms the impressions received from objects of sense. The fault does not lie in the afferent nerve, but in the central organs; not in the telegraph wire, but in the somewhat

muddled official sitting at the company's head office and endeavouring to decipher the messages. In truth, in our ordinary language, we give the senses a worse character than they deserve. They report correctly on various occasions, but we draw an incorrect inference or read their reports in a hasty or slovenly manner. It is only when the sensory apparatus is diseased in the first instance that we can properly speak of the senses deceiving us. The common reply to this apology for our senses is that in many instances, as in that of the oar which, although entire, looks broken in the water, our senses even in a healthy condition mislead us. A little consideration, however, will show that our senses are not really at fault even in this instance, and that if we arrive at a false conclusion, it is the result of our not making allowance for an intervening medium between the eye and the oar. Who would blame the eye because it could not have seen the oar at all, had there been a stone wall in the way? As unfair would it be to charge the eye with deception because its function is interfered with and distorted by an intervenient fluid. The child believes the oar broken because he has not yet learned the effect produced by the refracting power of water. Ignorance is the cause of an erroneous belief; the water the cause of the appearance of the oar; the organ of sight must be acquitted of all blame. Reid says he once met with a man who urged that the Protestant argument against transubstantiation from the testimony of our senses was inconclusive, because, as there are cases in which several of our senses deceive us, how do we know that they may not all deceive us in this instance? The discussion

which followed need not occupy our attention ; one on the same subject between Erasmus and Sir T. More is so much to the purpose, as the influence of Imagination united with belief is especially brought out, that it may be referred to, although the effect is rather a mental than a bodily one. The latter, when visited by Erasmus, endeavoured to convert him to a belief in the real presence, and assured him that if he would only believe, he would be satisfied of its truth by unquestionable evidence. On leaving More's house he borrowed his pony, and finding it very useful did not incline to return it, but sent the following lines ;

“ Quod mihi dixisti
De corpore Christi,
Crede quod edis, et edis :
Sic tibi rescribo,
De tuo palfrido,
Crede quod habes, et habes ;”

which a writer in ‘Macmillan’ for September, 1865, translates thus :

“ Remember, you told me
Believe and you'll see ;
Believe 'tis a body
And a body 'twill be.
“ So should you tire walking
This hot summer-tide,
Believe your staff's Dobbin,
And straightway you'll ride.”

(c) *Auditory*.—As regards the sense of hearing, it is very manifest that the thought uppermost in the mind—the predominant idea or expectation—makes a real sensa-

tion from without assume a different character. If of two children listening to a peal of bells, one is told they say "Long live the King," and the other, "Never, for ever," to each the chime may sound as he expects to hear it. But, of course, those instances are much more striking in which the expectation excites the central termination of the auditory nerve, so that sounds, voices, &c., are actually heard. The Imagination may be justly said to be the cause, but it is no imagination that sounds are heard. The fine passage of Madame de Stael: "So mighty sometimes is the power of Imagination, that by it we hear in our hearts the very voice and accents of one whom we love," is true in a more literal sense than probably she intended.

The influence of Attention in intensifying auditory sensations is constantly brought under our notice. The Highland woman hearing the distant pibroch when Havelock was approaching to the relief of Lucknow, is a beautiful illustration of the familiar fact that the intense direction of the thoughts to a particular sensation increases the sensitiveness of the sensorium.

Hyperæsthesia of the auditory sense is frequently observed in the so-called mesmeric state. The late distinguished ophthalmic surgeon Mr Critchett states, in a letter written to Capt. James in 1845, that he was witness of this exaltation of audition in a case in which he had himself induced the hypnotic condition. So acute was the hearing that the patient "heard the least noise even in the adjoining room." Mr Critchett adds that the patient could tell him when awake all that occurred during the apparent sleep. (*Private Letter.*)

Mr G. H. Lewes in an article in the 'Fortnightly Review' (February, 1872) on "Charles Dickens," states an interesting fact in reference to his brain-fictions, namely (what the novelist had himself told him), that "every word said by his characters was distinctly *heard* by him. I was at first," he adds, "not a little puzzled to account for the fact that he could hear language so utterly unlike the language of real feeling, and not be aware of its preposterousness; but the surprise vanished when I thought of the phenomena of hallucination." Such instances may be thought to support the opinion that the creations of the Imagination, and the images recalled by the memory occupy the same nervous tract as those which are excited by impressions from without, and that they only require additional intensity to become, what are admitted by all to be, (subjective) sensations possessing the distinctness which ordinarily characterises those of objective origin. At any rate, they show how great a tendency mere thought has to excite or awaken the correlated sensation. Dickens also says, in regard to his sister-in-law Mary, that after her death he was haunted by her image every day, and dreamt that he saw her every night for a year. He does not mean, we suppose, that he saw a spectral form in the day—merely a vividly defined and irrepressible memory of her person. In the dream, when the outer world was excluded, the very same image presented all the characters of a sensorial impression.

The uncertainty of determining the point from which sound proceeds, and the large extent to which we are guided by our opinion as to the direction whence it comes,

are shown in a striking manner by the simple experiment of blindfolding a person, and clicking coppers in different positions. His mistakes of answering correctly as to the locality where the coppers are clicked, are frequently as great as the certainty with which he maintains, guided by some illusory indication, that he must be in the right.

Anæsthesia of the special senses in regard to all impressions from without, except those with which a person from some particular cause is in relation, is strikingly exhibited in "biological" or hypnotic states. Thus a subject may be deaf to all sounds except the voice of the operator. Sir James Simpson pointed out this fact, years ago, at a meeting of the Edinburgh Medico-Chirurgical Society. He observed that such persons "were deaf for the time to other sounds. Bells may be rung in their ears, strong noises of all kinds made, tickling, shaking, rubbing the cornea, &c., practised, but they sleep on, apparently listening alone to the voice that sent them asleep to summon them again to the wakening state" (xxiv, and vii, Oct. 1851).

It may be said that in such cases it can hardly be true that the cerebral hemispheres act upon the sensory ganglia so as to produce this effect, and that it is rather that the impressions which reach the sensorium are not perceived by the mind, unless they be directly related to the idea or ideas which are at that time dominant. Still, the state of the Intellect determines the effect of the sensorial impression. This condition is exemplified also in cases of ordinary sleep, absence of mind or abstraction, day dreaming or reverie, as well as in the somnambulistic

states just referred to. Dr Carpenter states that "Sir Edward Codrington, when a young man, was serving as signal-lieutenant under Lord Hood at the time when the French fleet was confined in Toulon harbour, and being desirous of obtaining the favourable notice of his commander he devoted himself to his duty—that of watching for signals made by the look-out frigates—with the greatest energy and perseverance, often remaining on deck nineteen hours out of the twenty-four, with his attention constantly directed towards this one object. During the few hours which he spent in repose his sleep was so profound that no noise of an ordinary kind, however loud, would awake him, and it used to be a favorite amusement with his comrades to try various experiments devised to test the soundness of his sleep. But if the word "signal" was even whispered in his ear, he was instantly aroused and fit for immediate duty" (viii, p. 855).

Dr Kennedy, of London, formerly of Dublin, supplies me with a parallel instance in his own experience.

"I was taken," he writes, "by the last train from Dublin to see an urgent case at Kingstown, and had to return on the engine. The night was wild and stormy, and a spicula of hot coal was embedded in one of my eyes. On arriving in Dublin towards early morning, I repaired at once to our most distinguished oculist, Sir William Wilde, and succeeded in getting into his house and eventually into his bedroom, anticipating getting immediate relief at his expert hands. But I had counted without my host, as I found Sir William in a most profound sleep, out of which I could by no means rouse him; shouts, shakes and appeals were all equally unavailing.

He remained obtuse, and I had given up in despair, when it occurred to me to approach him by the ruling passion, or in other words to rouse him by touching the preponderating idea that occupied his mind. I therefore placed my mouth close to his ear and in whispered accents uttered, "Wilde, there is a foreign body in my eye, I want you to take your lancet and remove it, my eye is in agony." The effect was electrical. He sprang to his feet took the candle from my hand, and seizing a lancet I handed him, placed me sitting on a chair, everted the lid, exposed the spicula, removed it in a trice, putting me into heaven at the same moment, completed his work, and we separated mutually pleased with each other. The process appeared to be automatic, though in a moment of waking, and sleep seemed to be instantly resumed."

(d) *Gustatory*.—So with the sense of taste. "Hold your tongue!" exclaimed a Frenchman, "I cannot taste my dinner." The conversation distracted his Attention, and would not allow him to dwell upon his viands with the gusto which a gourmand desires. With imaginative people, the food eaten or the fluid drunk assumes a very different taste according to the fancy. Misled by Expectation, the grumbler finds the meat taste bad; the water is abominable. I have known a gentleman hopelessly fanciful, send out the cream from table because it tasted sour, and find it sweet when the servant brought in what was supposed to be, but was not, a fresh supply.

(e) *Tactile* (see *Æsthesia*).—With persons very sensitive to tickling, the mental state of expectation aroused by

the approach of another's finger towards a sensitive part of the body is, as every one knows, sufficient to cause the sensation of titillation. Nay, even the thought of it, without the gesture, may suffice to induce it. And the converse, the powerful determination to resist the sensation, is frequently found to be effectual.

The influence of belief or expectation in bewildering sensation, and rendering the subject unable to note or localise the altered conditions of pressure on the surface of the body is important to the investigator into the alleged spiritualistic phenomena of our day. Such influence and the extraordinary ease with which persons are misled do not prove such allegations are all baseless, but they unquestionably prove that no one is entitled to believe them unless he has first mastered the deceptive influence of certain mental states upon bodily sensations.

On the 25th November, 1880, Mr Cumberland gave at the Casual Club, London, some good illustrations of the way in which the senses are thus liable to be completely mystified. From a short notice recorded by the writer in the 'Journal of Mental Science,' (January, 1881) he extracts the following :—"The primary object of the exhibition was to expose modern spiritualism ; but its interest for the psychologist consisted mainly in the confusion induced in the sensory perceptions by certain manifestations. Thus, for example, Mr Cumberland placed himself at a table with two gentlemen, sitting one on either side of him, with whose hands he joined his, the gas being lighted. Having satisfied themselves that both Mr Cumberland's hands were attached to theirs, they, at his request, shut their eyes, and were asked

whether they still felt his hands touching theirs. They answered affirmatively without any hesitation, whereas Mr Cumberland had dexterously removed one of his hands and made the other do duty for both. Having obtained their full assent to this proposition, the operator, having one hand free, employed it as a "spirit hand" to touch the heads of the gentlemen, placing also upon one a trombone. Mr Cumberland then resumed his former connection by both hands, without the subjects of the experiment being conscious of the change; and when they opened their eyes they were clear in their opinion that whoever touched them and placed the instrument upon their heads, Mr Cumberland did not. The illusion was complete."*

Availing oneself of the same principle, one can easily make a person believe that a ring has been placed upon his arm while his hands remains in unbroken contact with the operator's. The surprise and bewilderment of the subject of the experiment, to which we have often been witness, are proofs of the way in which tactile sensation may be led astray by the ruling thought of the moment. The trick is thus described by Mr Cumberland:—

"A famous test introduced at dark *séances* is that of passing a ring over a sitter's arm in proof of the dematerialisation theory. As the sitter is holding the medium's hand when the manifestation takes place, the

* These experiments are not given by me for the purpose of exposing spiritualism. Even if spiritualism were true, their force would remain precisely the same for the purpose I have in view of exhibiting the influence of the Mind on Sensation, &c.

spiritualists declare that either the ring in getting on to his arm must have been de-materialised or that a passage must have been made in the arm to allow of the ring passing through. . . . All that the medium has to do is, having got his hand free in the manner described, to take up the ring, passing it over his own arm, and having regained his hold of the sitter's hand, ask him to grasp his hand firmly, in order, he adds, to avoid trickery, and as a natural consequence, the ring comes sliding down to the sitter's arm, who is confident that he never for one moment let go his grasp."*

Appreciation of weight.—The sense of *weight* has frequently been misled by the Imagination. The anecdote of Dr Pearson, though well known, is so good an illustration that it can hardly be omitted in this place. When potassium was discovered by Davy, Dr Pearson, taking up a globule, estimated its weight on his finger, and exclaimed "Bless me how heavy it is!" simply from expecting a metal to be so, whereas the reverse was the real truth.

In his 'Human Physiology' (4th edit., p. 821), Dr Carpenter states that he "has seen a man remarkable for the poverty of his muscular development, who shrank from the least exertion in his ordinary state, lift a twenty-eight-pound weight upon his little finger alone, and swing it round his head with the greatest facility." Now, this was due, first, to a mental condition rendered acutely susceptible to impressions, and then to the action of the Imagination, when the subject was assured that the weight was a mere trifle, and that he could lift it easily. This

* 'Journ. of Mental Science,' July, 1881.

idea by affecting the muscular sense of resistance, produced the same effect as actually lessening the weight would have done. Again, to the same individual, when in the same impressible state, a handkerchief placed on the table felt so heavy that he could not raise it after repeated attempts to do so.

In regard to other muscular sensations, they receive further illustration from the influence of the Attention on involuntary movements, in the chapters on muscular action.

Sense of equilibrium (semi-circular canals).—As an illustration of the disturbance of the senses by combined exerted attention and fear (for it is difficult to separate the two in illustrations of this disturbance), we may mention the effect produced on persons suffering from sea-sickness by having to bestir themselves on board ship and having to bale out the water in consequence of threatened danger to the vessel. The annoyance of having lost a valuable set of artificial teeth, over board, by a gentleman labouring under sea-sickness, has been known to promptly arrest the attack.

Visceral sensations.—We do not propose to enter at large upon the influence of the Intellect upon the sensations of visceral origin. The general observation may be made that attention to the various processes of secretion and nutrition not only excites their activity, as will be subsequently shown, but it is accompanied by more or less well-defined feeling. The ordinarily obscure sensations which these processes occasion become intensified, and a long train of hypochondriacal symptoms follows. Under this head are comprised the sensations of the alimentary canal,

including the pharynx, œsophagus, stomach, and intestines. The familiar sensation at the pit of the stomach, the consequence of perturbations of mind, belongs to the Emotional section of mental states, under which also the disagreeable sensations of hypochondriasis will be referred to, although admitting of explanation by a reference to the mere operation of the Attention.

Attention directed to the stomach notably causes a sensation of weight, aggravating or even originating dyspepsia. Discomfort, a sense of tension, and other forms of sensation may, every one knows from experience, be induced in the several abdominal organs.

Probably no simpler example could be given than the following common occurrence :—A child says, “ thinking of that powder almost makes me sick.” In fact he experiences nausea from no physical agent but solely from the representative idea thereof in his mind. But for our familiarity with the fact, it would greatly surprise us that such should be the case.

Squeamishness is frequently caused by Attention and by other allied mental states. Marshall Hall mentions a person who could not attempt to untie a small knot without a sense of nausea.

In concluding this Section I wish to revert to states of Mind in Recollection and Imagination in connection with the vexed question of the character and seat of resuscitated mental images.

It is disputed as regards the ordinary memory of an object or the creations of the Imagination—representative consciousness—whether the same psychical or encephalic condition is excited as in the actual perception of an

object present to the senses—presentative states of the Mind. It is obvious that the answer to this question is of great interest in the consideration of the influence of ideal psychical states upon the body, whether intellectual or emotional. The teachings of psychologists of the present day appear decidedly to favour an affirmative reply.

Abercrombie's work on the 'Intellectual Powers' elicited a remarkable review in the 'Quarterly' for July, 1831, from the pen of Sir David Brewster, who combated the idea that in Memory and Imagination the mind recalls past impressions and forms fresh combinations, "without any assistance from the organs of perception," and maintained that while in the ordinary action of these faculties, owing to the exceedingly fleeting character of the mental images produced, and the counteracting influence of the external world, we cannot fix and subject them to examination, there are exceptionally favouring circumstances which render it possible to examine them as carefully as impressions made upon the retina by luminous bodies, and that in these cases the images recalled by Memory, or created by Imagination, "follow the motions of the head and eye." This he explained by supposing that the recollection of an object previously seen, acts by retransmission from the brain along the nerves to the same points of the retina as had been acted upon by the original object, when the impression there had been transmitted to the sensorium. A very faint and transient impression was supposed by him to be formed on the retina, just sufficient for the purposes of Memory and Imagination. If, moreover, these faculties

are powerful, and the nerves excitable, the retinal impression becomes so distinct as to constitute a spectral illusion. Brewster's general conclusion was this, that "in all our organs of sense, the mind possesses the power of retransmitting through the nervous filaments to the expansion of the nerves which are acted upon by external objects, impressions which these nerves have previously transmitted to the brain," feeble in ordinary Memory and Imagination, brilliant and phantasmatic in abnormal states of the brain or nerves. If for the peripheral expansion of the sensory nerves we substitute the sensorium, or whatever that portion of the brain may be in which impressions are registered, Brewster's opinion is in accordance with that to which we have just referred. His proofs are not altogether satisfactory, for, in the first place, the examples he adduces are not those of ordinary Memory or Imagination ; and, secondly, as regards actual phantasms, the fact that they move with the eye may be explained on another principle than that of referring the revived impression to the external organs themselves.

At first sight, simply to think of and recall the face of an absent friend, and so to think of him as to see his face projected as if present before me, do certainly seem very distinct psychical, and therefore encephalic, conditions not only in degree or intensity, but in kind and seat. The one operation feels to be so purely "mental," the other so sensorial. That subjective sensations and objective sensations occupy the same seat cannot be doubted ; but the difficult question is, whether the definite remembrance of a particular object passing beyond a mere notion, does or does not cause a true sensation, however faint.

It is easy to believe that the seat of a spectral form of a mountain is identical with that of the conscious impression of the actual object when present to the senses, but not so easy to believe that in recollecting a certain mountain, and tracing its outline, or imagining one, "we are repeating the same currents and reanimating the same nervous tracks as in the survey of the actual mountain" (Bain). In opposition to this hypothesis it is urged* that perception is a *bi-une* fact, or a synthesis of cognition and object, while memory and imagination are not so, for the object is not present to them. It is denied that seeing a rose and the remembered outline of a rose involve the same operation of mind—the only difference being, as alleged, one of intensity. Dr Carpenter, on the other hand, speaks of "ideas or conceptions as cerebral (*i.e.* hemispherical) states, which seem to recall the same condition of the sensorium, as that which was originally excited by the sensory impression" (viii, p. 749). It is true, I can think of a rose, have a bare abstract notion of it, without any action of the sensorium, but it may nevertheless be true that the moment it is figured in the mind's eye, although no spectrum or phantasm is formed, there occurs a change in the optic nerve centre. Still, we think, it is practically difficult to decide at what point the strictly ideational passes into the sensational.

Let us, on account of the importance of the subject, consider a little further the changes which physiologists

* See this position ably maintained by the Rev. W. G. Davies in the 'Journal of Mental Science' for April, 1864. See also the observations of Lockhart Clarke in the 'Psychological Journal,' January, 1863, p. 19.

assume take place in recalling a sensation, such as seeing a person's countenance in the mind's eye. According to Carpenter, it is, as we have seen, a secondary change, caused by the influence of ideational (hemispheric) activity upon the sensory ganglia. I recall the notion of this object—the face—by which the sensory impression or state was formerly produced, and by keeping such notion before the consciousness, I am enabled to see in my mind my friend's face. The general notion is all that some can attain to, the sensational state not being reproduced. He remarks that we can remember the *expression* of a countenance better than the *features*, because the former appeals most to our ideational consciousness, while the latter obliges us to recall a sensational state. As in recollection, so probably is it in spontaneous or passive memory; though here external objects may help to excite the renewal of previous sensations. His special theory which ought to be kept distinct from the general question is that the sensory ganglia, in all probability, do not register sensory impressions; "these can only be reproduced afresh by the action of external objects, or ideational changes." The hemispheric ganglia, in reproducing ideas, act independently of the sensorium, except that according to this physiologist, the results of such cerebral action "must be impressed on the sensorium before we can be rendered conscious of them." Probably every sensory impression, once perceived, is registered in the cerebral optical perceptive centre, and "may be reproduced at some subsequent time, although there may be no consciousness of its existence in the mind, during the whole intermediate period" (p. 808).

It is not necessary to adopt, in an unqualified manner, the details of this somewhat elaborate theory, founded to a large extent upon the hypothesis that the hemispheres themselves are not the seat of consciousness. The essential point remains, and is as applicable to the present subject, if the hemispheres are as we hold, conscious ganglia without the co-operation of the ganglia beneath them. We have seen that Bain (who upholds the latter view) is equally strong in maintaining that the ideas which our memory and imagination form of external objects, involve the action of the same tracts in the encephalon as are excited by impressions immediately derived from the material world, or from those internal subjective stimuli which cause actual hallucinations.

Again, Herbert Spencer, the teacher, *κατ' ἐξοχήν*, among psychologists, of the doctrine of evolution, arrives by this and other routes of profound psychical investigation at the same conclusion. Thus, he says, when speaking of the ideas of throwing a stone, or seeing a dog run away, "these, that we call ideas, are nothing else than weak repetitions of the psychical states caused by actual impressions and motions" (x, p. 456). An expression he employs is a very forcible one—the nascent excitation of nerves in the revivability of former impressions. In the above-mentioned acts this occurs, as respects the motor apparatus, in thinking of throwing a stone; and as respects the optic nerves, in the mental picture of a dog running away. "Those vivid states of consciousness which we know as sensations, accompany direct, and therefore strong, excitations of nerve-centres; while the faint states of consciousness which we know as remem-

bered sensations, or ideas of sensations, accompany indirect, and therefore weak, excitation of the same nerve-centres" (p. 124).

Just, then, as in perceiving objects around us, subject-consciousness and object-consciousness are united, sensorial perception passing insensibly into intellectual perception ; so in recollection and imagination, the ideational and sensational changes are almost inseparable ; the calling up of one of the states as originally excited by external objects, calls up the other and in this way the old paths are traversed, though in a reverse order. It must, however, be admitted that the original idea which was abstracted from the sensorial perception can arise in the mind, or be recalled as a general notion, without the action of the sensory centres being excited.

The application of this position to the influence of ideal states of mind is obvious ; whether they excite by their intensity and vividness general bodily sensations, or such action of the sensorial centres that the mind refers the special sensations to objective sources of excitement ; whether they cause movements, or whether they act upon the organic functions. Whatever hypothesis we adopt, the fundamental fact remains that sensation and motion are not merely more readily reproduced by the original impressions being repeated, but may be reproduced without our having the slightest recourse to them, so that we may breathe an atmosphere in which the body feels, the eye sees, the ear hears, the nose smells, and the palate tastes, as acutely as if the material world excited these sensations, and may perform muscular actions without, and even against, the will, and with or without con-

sciousness, solely in response to ideas, whether recalled by the memory or created by the imagination—the common centre acted upon by objective impressions from without and by subjective impressions from within, being the sensorium, and the resulting sensations and motions being in many instances as powerful from the latter (the inner) source as from the former, and in some more so.

The following are the most important conclusions in connection with the Influence of the Intellect on Sensation :—

1. When ideas arise from the sensorial perception of impressions upon the peripheral terminations of the various classes of nerves, they may react upon the sensory centres, and influence general, special, organic, and muscular sensations, causing sensational illusions.

2. When, through intellectual operations, ideas are imagined or recalled, these may be merely ideational states, but they ever tend to become identical in character though not necessarily in degree, with the complex states formed when peripheral impressions from external objects first excited them. The recurrence therefore of the ideational states, co-operating with the sensory centres, usually recalls also, although but faintly, the sensation corresponding to the idea.

3. In some conditions of the brain, the sensory centres may be so powerfully excited, that the effect is identical in sensory force—in objectivity—with that which results from an impression produced upon the peripheral terminations of the nerves, causing hallucinations or phantasms.

4. The mind under certain circumstances can, by

Attention, recall the sensorial impression so distinctly as to produce, *e.g.* in the case of sight, the spectrum or image which was impressed on the retina and perceived by the sensorium.

5. Not only may hyperæsthesia of one or more of the senses be produced, but complete anæsthesia be caused by the actions of the Intellect.

CHAPTER III

INFLUENCE OF THE INTELLECT UPON THE VOLUNTARY
MUSCLES

The several mental states comprised under the Intellect may, by their action on the voluntary muscles, induce—

- I. *Co-ordinate contraction and relaxation : Movements.*
- II. *Irregular and excessive contraction ; Spasms and convulsions.*
- III. *Loss of power : Paralysis.*

SECTION I.—Muscular Contraction and Relaxation :
Movements

THE influence of an intense and exciting idea or thought in inducing well-marked movements, is admirably illustrated in the description of two characters—one real, the other, indeed, fictitious, but sketched by the hand of a master, equally true to nature.

Sir Philip Francis is described by his biographer as “pacing rapidly forward *as if to pursue a thought*. He would then suddenly turn short round, draw himself up

to his full height, and 'with a sweeping of the arm' evolve some epigrammatic sentence or well-rounded quotation. Even his own family habituated as they were to these sudden interruptions of the measured tread, with which he loved to pace up and down the utmost length that a small suite of rooms would allow him, were sometimes startled by the vehemence of the outbreak, and strangers were absolutely electrified" (xiii, i, p. 454).

The other character,* fictitious, is thus graphically described :—"His small, nervous body was jarred from head to foot *by the concussion of an argument* to which he saw no answer. In fact, the only moments when he could be said to be really conscious of his body were when he trembled under the pressure of some agitating thought." To some extent, no doubt, in both these instances, the intellectual element was followed by emotional excitement which intensified the character of the external commotion.

Observe the eye when thought is concentrated upon a subject of purely intellectual interest. It illustrates a law we shall speak of more fully when we have to treat of the Emotions—the parallelism between the outward signs of mental states and the action of the senses.† Why, as regards any practical good to be attained, should

* Rev. Rufus Lyon in his conversation with Mrs Holt. George Eliot's Works, 'Felix Holt,' p. 47, popular edition.

† Figurative or metaphoric expressions derived from Sensation are introduced here, instead of in the chapter on Sensation, in order to illustrate the parallelism between the action of the muscles when excited by Sensation and by Emotion. Diderot pointed out the importance of this correspondence, but we are mainly indebted to Gratiolet for having worked out the idea in detail.

any change occur in the organ designed only to examine external objects? Yet, as if stepping out of its province, it frequently peeps and pries, and strains all its powers to gain an insight into what is hopelessly beyond its ken. Why, but because the movements excited by the objects of the outer world, acting upon the senses, take place not only then, but when the thoughts are occupied by ideas having no relation whatever to the external world. It may seem a contradiction to this statement that, in profound meditation, the eyelids are sometimes closed to exclude outside distractions—the impressions from without calculated to confuse those from within—but the exception is only apparent, for the eye, when thus veiled, continues to fix its gaze steadily upon imaginary objects, or in motion endeavours to track an idea through intricate mazes of thought. The appearance of the eyes in ecstasy is a striking example of the appropriate, but, so to speak purposeless, action of the muscles of the eyeball in ideal states of mind. Again, the axes of the eyes in an absent man walking through the street are not fixed upon the objects which he meets, but are directed towards a point suggested by a subjective image. Hence, confused vision and the danger of running against anything in the road. The philosopher is described by Engel as walking, while pursuing some luminous train of thought, with his eye ardently fixed, the eyelids sometimes joyously opened, sometimes half-closed, engaged in imaginary contemplation. Figurative language corresponds to figurative gestures. We speak of the “mind’s eye” and “mental insight.” When we perceive the bearings of a question, we say emphatically “we *see* it.” “The *eyes* of your

understanding being enlightened" is another familiar example, and we must add—

"Who so gross
As cannot see this palpable device?
Yet who so bold but says he sees it not,
When such ill-dealings must be *seen in thought*?"

The French say "*Je goûte cela*," a mode of speech characterised by Gratiolet, as "*eminemment heureuse et fine*," and he ends a lecture by expressing a hope that his propositions have been "*goûtées*" by the intelligence of his hearers.

The behaviour of the gustatory muscles and the salivary glands is in strict accord with this, when engaged in an *intellectual repast*, "the feast of reason and the flow of soul." Such expressions are sufficiently significant of the fact that figurative movements accompany certain operations of the Intellect, namely, smacking the lips, swallowing, &c. The description of Captain Porter at the Marshalsea, in Dickens' reminiscences of his early life, is most characteristic of this principle. He read aloud a certain petition, prepared to present to the king, praying for a bounty to the prisoners to drink his Majesty's health, on the occasion of his birthday, to all who would hear it when attaching their signatures. "Captain Porter, in a loud, sonorous voice, gave him every word of it. I remember *a certain luscious roll* he gave to such words as 'Majesty—gracious Majesty—your gracious Majesty's unfortunate subjects—your Majesty's well-known munificence,' *as if the words were something real in his mouth, and delicious to taste*" (Forster's 'Life,' vol. i),

"J'entends cela" means either I hear or understand that—a double signification, due to the same remarkable parallelism exciting between the two series of facts; and although here the muscular correspondence is not, at once so clear as in the case of sight, the expression of the facial muscles, when a subject is not understood, strikingly resembles the painful distraction of deafness.

We will only add, by way of illustration of all the senses being figuratively used, the forcible language of Sir Philip Francis, on receiving from Edmund Burke a proof-sheet of his reflections on the French Revolution—language worthy of "Junius:"—"The mischief you are going to do yourself is, to my apprehension, palpable. It is visible. It is audible. I snuff it in the wind. I taste it already. I feel it in every sense, and so will you hereafter" (xiii, ii, p. 282). A really magnificent example of figurative expressions!

The influence of expectation (or expectant attention) upon the facial muscles, is well exemplified in the appearance they assume when a gun is about to be fired. The person so affected does not expect that anything is going to happen to himself, but there is a certain involuntary nervous twitching, which anticipates the instinctive contraction of the muscles around the eye, occurring when a sudden explosion or shot actually requires the protection of the eye from danger.

The effect of thought upon the facial expression, universally admitted as it is, has hardly been recognised till recently in definitely indicating in a most unintentional but frequently precise manner, the idea at the moment present to the mind. It is by this means that a "medium"

or a "thought reader" can often tell a person his name or the word he is thinking of, by inducing him to point to the letters of the alphabet in succession. The slight, yet sufficient movement in a facial or other muscle on touching the right letter, all unconscious as it is, suffices to prove a tell-tale, and it is certainly astonishing when first witnessed. Mr Cumberland has repeatedly shown how difficult it is for some people under expectant attention to control their muscles so as to offer no clue as to what is going on in their minds. "With such people, keen-sighted mediums, with their natural perceptive faculties sharpened by practice, have an easy task; but with less impressionable persons a greater difficulty is experienced, whilst nothing but failure results from those possessing a stoical temperament" (xxi, January, 1882).

We see a different form of expectation exhibited in the common experiment of discovering the time of day, by holding a coin or ring by a hair or silk thread suspended between the finger and thumb in a glass, against the sides of which it is expected to beat the time of day. As is well-known, it often proves successful, the unconscious action of the digital muscles responding to the idea or expectation present in the mind of the person making the trial. I was not aware that this, with a slightly different object, had been an old experiment, until looking recently into Lord Bacon's works I found the following:—"It is good to consider upon what things imagination hath most force; and the rule, as I conceive, is that it hath most force upon things that have the lightest and easiest motions. . . . Whatsoever of this kind should be thoroughly inquired into. . . . There would be

trial made of holding a ring by a thread in a glass, and telling him that holdeth it, before, that it shall strike so many times against the side of the glass and no more." He adds an experiment depending for its success on the same principle, that of "holding a key between two men's fingers, without a charm, telling those who hold it, that at such a name it shall go off their fingers." Bacon concludes thus:—"Howsoever, I have no opinion of these things, yet so much I conceive to be true; that strong imagination hath more force upon things living or that have been living, than things merely inanimate; and more force, likewise, upon light and subtile motions than vehement or ponderous" (xiv. 'Nat. Hist.,' 957].

From the time of Bacon to that of Chevreul no one, so far as I know, investigated the subject in a philosophical spirit. The latter, finding that a pendulum composed of a flexible wire and heavy weight, would oscillate when held by the hand over certain bodies (*e.g.* mercury), although the hand was fixed and motionless, placed a sheet of glass between the mercury and pendulum when in motion, and found its oscillations uniformly impeded and at last arrested. Feeling that he had not discovered in the quicksilver the real cause of the motion of the pendulum, he fixed the hand from which it was suspended, instead of merely the arm. The result was that the pendulum did not move at all, whether, or not, the glass intervened between it and the mercury. He justly concluded that an unconscious muscular movement explained the oscillations which had puzzled him, and he had a vague remembrance of being in "un état tout particulier" (xv, p. 280) when his eyes followed them. He next took the

precaution to have his eyes bandaged, and found that this also had the effect of preventing any action of the pendulum.

His careful investigations resulted, therefore, in the conviction that, although a pendulum suspended from the hand over certain bodies moves and performs oscillations which increase more and more in extent, this motion is diminished and at last arrested, if glass, or anything else, be interposed between the pendulum and the body over which it oscillates, with the *expectation* that it will have this effect. Further, it is arrested the moment the hand itself is supported, or if the eyes of the experimenter are bandaged; the reason of the latter being that the guiding sense of sight, so essential to motion when the will is in abeyance (as exhibited in paralysis), has been taken away.

Nothing can more clearly illustrate than the above experiment, the influence of what is popularly called the imagination, and which resolves itself in such cases into expectation. It forms an *experimentum crucis* which demonstrates the true principle at work in a large number of the cases given in this book; a principle which, when called by its right name, is by no means to be despised. For the pendulum substitute a limb contracted from functional disorder, and the application of the same law becomes practically useful. The operation of the imagination is reduced to simple imaging, and can be intensified by other psychical forces.

One more exceedingly simple illustration may be adduced of the influence of what may be called expectant imagination upon muscular action; and that is, the act of *falling*, from expecting to fall, as happens to a man

walking on a narrow, but sufficiently broad, path on the top of a house or mountain. In Bacon's 'Natural History' this very example is given under "Experiment solitary, touching the force of imagination, imitating that of sense." The *rationale* being thus worded, "for, imagining a fall, it putteth his spirit into the very action of a fall."

The involuntary and unconscious movements performed when the hands rest on a table with the expectation of it moving, and its consequent tipping, are notorious instances of the influence of mind on the voluntary muscles. Mr Cumberland attended a *séance* where all present were "perfectly honest though self-deluded." As no manifestations took place, the question was asked whether there was any sceptical influence at work which prevented "the spirits" manifesting, and the table tipped "*Yes*" (three tips). In reply to the enquiry whether there would be any manifestations, the table tipped "*No*." Mr Cumberland remarked "there will be no manifestations," and held his thumb under the rim of the table. "I saw the sitters exchange glances, and once more the table began to waver; finally under the predominating influence of those who were in favour of the 'spirits' manifesting, it tipped out an answer negating the first. With my thumbs thus placed, I distinctly felt the sitters opposite to me push the table, causing it to tilt." Yet it appears that for years these well-meaning people had been sitting at the table, unconsciously causing it to answer their questions, firmly and honestly convinced that the tilts were due to supernatural agency (xxi, January, 1882).

Professor Barrett of Dublin has contrived a very simple

apparatus, by which the pressure of the fingers on a board or wheels moves the indicator on a dial containing the letters of the alphabet. If the experimenter expects a certain word—say his name—to be spelt out on the dial, he will as a rule, should his eye rest upon the indicator, so unconsciously influence it by pressing on the board that the letters will be correctly indicated.

Since the first edition of this work appeared, attention has been forcibly directed to the subject of *thought-reading*, principally through the public performances of Mr Bishop and Mr Cumberland who have succeeded in many instances in divining the thought present in the mind of a person at the time.

Granting, for the sake of argument, that one man has ever possessed the power of becoming actually cognisant of the thoughts of another directly and not through any of the senses, such alleged power of clairvoyance has nothing whatever to do with the object of this treatise, for it affords no illustration of the influence of the mind upon the body. It belongs to an entirely different class or order of phenomena and ought to be carefully kept distinct.

On the other hand, the fact that such thought-reading is performed through the indications afforded to the observer by the influence exerted by the thought present in the mind upon the features or other parts of the body of the subject of the experiment, affords a very striking example of the influence which in this work forms the subject of enquiry.

Having had various opportunities of carefully observing the attempts made by both Mr Bishop and Mr Cumber-

land, the author has no hesitation in referring their success, so far as they are successful, under test conditions, to the operation of those laws governing the action of Mind on Body which are discussed in these pages.

Few persons without the proof afforded by such experiments could be prepared to expect that their thoughts are so rapidly transmitted, and as a rule so accurately registered, upon the muscular and vascular system; yet such is undoubtedly the truth, and being true, the power of reading the thoughts must altogether depend upon the observation, acuteness, and experience of the observer. That by these qualifications great, and what at first sight appears marvellous, success can be attained, has been now abundantly proved. A man conceals unknown to the thought-reader an article in any place he chooses; the latter enters the room blindfolded or not, and takes hold of the hand of the subject, and it may be, presses it to his forehead. He then walks rapidly with him through the room, throwing all his mind into the pursuit, and concentrating his attention upon the faintest indication of the subject's thoughts—the latter, wholly unconscious that he is all the time speaking, not indeed through his voice, but by his muscles, tightens or relaxes the grasp of the thought-reader's hand or presses more or less forcibly upon his forehead, according as he approaches or recedes from the hidden article. More than this, the vaso-motor system is affected by the excited attention or expectation of the subject, the pulse quickens and the hand perspires on approaching the object of search. That the indications afforded by the involuntary contraction of the voluntary muscles and the state of the circulation and sweat glands,

are often supplemented by the tact and pardonable guesses of the thought-reader as to where the object is likely to be secreted, the author does not doubt ; but that there is a sufficient amount of actual muscle-reading to make the experiments of scientific interest and fairly applicable to our present purpose, he as little doubts. When not blindfolded, or imperfectly so, a thought-reader is further assisted by the unconscious facial expression of the subject, as he nears the concealed article.

Mr Alfred O. Capper who has proved himself, to my knowledge, very successful as a thought-reader, writes to me as follows :—" I consider the term ' thought-reading ' a wrong one, as I never receive any actual transmission of thought. In my opinion, the subject does very often quite involuntarily and unconsciously lead me to the spot, though I have succeeded with several gentlemen who have purposely tried to prevent me accomplishing the object as far as the pressure of the hand is concerned.

" I am always blindfolded, and generally feel an impulse to rush to a certain place, and I go to the exact spot, although it may be a short time before I find the article that may be hidden. Of course I cannot succeed with every ' subject,' but I generally am successful.

" As I said before, the ' subject ' does very often help you, although he will declare he did *not* do so. But how it is one sometimes succeeds with others who do not give you any muscular indication, I am really unable to say. So-called thought-reading is a most interesting study." (Jan. 29th 1883.)

The influence of Sympathy or Imitation on the body has been referred to when speaking of the signification to

be attached to these terms. Southey has recorded in 'The Doctor' a remarkable instance of Imitation, in which the automatic action of the brain is strikingly exhibited :

"I remember," says a certain Mr George Garden, in a letter written from Aberdeen in 1676, "when Mrs Scorrall and I were with you last summer, we had occasion to speak of a man in this country very remarkable for something peculiar in his temper, that inclines him to imitate unawares all the gestures and motions of those with whom he converses. We then had never seen him ourselves. Since our return we were together at Strathbogie where he dwells, and notwithstanding all we had heard of him before, were somewhat surprised with the oddness of this dotterel quality. This person, named Donald Munro, being a little, old, and very plain man, of a thin, slender body, has been subject to this infirmity, as he told us, from his infancy. He is very loath to have it observed, and therefore casts down his eyes when he walks in the streets, and turns them aside when he is in company. We had made several trials before he perceived our design, and afterwards had much ado to make him stay. We caressed him as much as we could, and had then the opportunity to observe that he imitated, not only the scratching of the head, but also the wringing of the hands, wiping of the nose, stretching forth of the arms, &c. ; and we needed not strain compliments to persuade him to be covered, for he still put off and on, as he saw us do, and all this with so much exactness, and yet with such a natural and unaffected air, that we could not so much as suspect that he did it on

design. When we held both his hands and caused another to make such motions, he pressed to get free ; but when we would have known more particularly how he found himself affected, he could only give us this simple answer—that it vexed his heart and brain.”

The Sympathy of the whole frame with the prominent ideas of the mind, by which one muscle or organ, when aroused to action by mental states, excites other muscles or organs, should not be overlooked. The term so applied has the authority of John Hunter, who lays down the law that “every part of the body sympathises with the mind, for whatever affects the mind, the body is affected in proportion” (ii, iv, p. 167). This homogeneity between the actions of the muscles is exhibited whenever one muscle is excited by mental activity. When ideal, it follows the course which would have been pursued in reality. As in presence of an actual scene, so in Imagination, when a person vividly imagines another in danger—say from the fall of a heavy weight—how the entire attitude assumes the form of averting the impending danger ! Reason tells him it is altogether useless to move a single muscle, yet not only does the law of Sympathy impel him to gesticulate, but forces the whole system into harmonious action—the eye, the facial muscles, the arms, and the legs, are thrown into violent action. When the scene is purely the work of Imagination, the effect is ordinarily feeble in character ; but when a real scene is witnessed at too great a distance to render assistance, while the horror depicted in the countenance is merely the facial expression of the Emotion, the motions of the arms, trunk, and legs are the

automatic representations of the forms they would actually assume if rendering help on the spot. Thus, from the wonderful fellow-feeling established by nature between mind and mind, body and body, or between the various parts of the mental and bodily constitution of an individual, the Imagination, "sending electrical thrills through every nerve of the body," stirs, through the operation of Sympathy, the whole being to its depths; the nearest stations being in communication with the most distant outposts, and the frame changing now with its own and now with another's condition, as reflected in its own chambers of imagery.

The influence of Attention, pure and simple, upon the voluntary muscles (usually muscular sensations) is not so striking as that of some of the foregoing mental states. Directed to the pharynx, it usually occasions deglutition. If we are engaged in swallowing food, it does not assist the regular action of the muscles, but disturbs it; the impression made by the presence of a morsel in the gullet, and that derived from the Attention, not being necessarily consentaneous. Attention or the direction of Thought to a part, does not affect the muscles under the control of the Will so easily as those which are not; and it is the semi-voluntary character of the pharyngeal muscles which renders them, among the striped muscles, the most susceptible to its influence. The muscles engaged in articulation are also markedly influenced by Attention, though not so much so as by Emotion. In the pronunciation of words, the embarrassment caused by too prolonged an Attention to the emphasis and the aspirates, is familiar to all; and the only remedy then is to pronounce

them with as little thought as possible as to their correct enunciation. Thus a schoolboy becomes frequently thoroughly "pottered" by the teacher's method of tuition ignoring the operation of this principle, and the more he is ordered to attend carefully to minute shades of difference in his mode of reading or speaking, the more difficult does it become. In stammering the influence of Attention is well known, apart from those occasions in which it is mixed up with emotional excitement.

Other examples might be given, but these, with the illustrations already brought forward under Expectant Attention, are proofs of the influence of the Attention, directed in a definite manner. In truth, as regards the voluntary muscles, it almost requires the guiding influence of an expectant idea to induce any well-marked action. Simple attention to the finger or the foot seems, however, to render it more difficult to keep it motionless. A certain fidgetiness is begotten in the muscles of the part. These irregular muscular contractions occurring as a result of this cerebral state, appear to be indicative of an overflow of energy from those centres, which are connected with the higher intellectual processes, more especially with attention to either the motor portion of the cortex or the basal ganglia. The latter seems the more probable, if we accept the current ideas concerning the analogous case of the movements in that morbid condition known as post-hemiplegic chorea or athetosis.

Whether the movements occurring from attention are purely automatic or partially voluntary, the hemispheres appear to act upon the sensori-motor ganglia, and the influence is transmitted, in either case, through the

medium of the same cerebro-spinal nerves as convey the mandates of the Will. In directing the Attention to a special point of the body, an idea may act directly upon the motor ganglia and nerves (ideo-motor action); or it may set up action in one or more of the sense-centres (ideo-sensory action), and so secondarily lead to movements.

SECTION II.—Irregular and excessive Muscular Contraction; Spasms and Convulsions.

Few are the illustrations which will be given of the influence of the Intellect in causing spasms and convulsions. When we treat of the Emotions our cases will be abundant, and the difficulty will then be in selection rather than collection. A cold and abstract idea, before it generates an Emotion, is not calculated to cause excessive muscular contractions.

Mental application, even of a very slight character, may cause a fit of epilepsy. Marshall Hall observes:—"Dr Tyler Smith has related to me an instance of an epileptic girl who experienced an attack whenever she tried to undo a difficult knot in her work, which was tapestry" (xvii, p. 24). Galen mentions a young man, a grammarian, who had epileptic fits whenever he studied hard.

It is, however, when a powerful Expectation is excited that we are most likely to witness spasm or convulsion. To obtain cases in which Expectation of the phenomenon only exists, without the emotion of Fear, is, however, a difficult task.

We conclude from the statement of the French Commissioners on Animal Magnetism—"upon persons endowed with sensitive nerves we have produced convulsions, and what are called crises,"—that the effect was brought about by leading the subjects to expect a certain result. They add, "Animal Magnetism alone, employed for thirty minutes, has produced no effect, and immediately the Imagination has produced upon the same person, with the same means, under circumstances absolutely similar, a very severe and well-characterised convulsion."

The confident assertion that a person subject to epileptic fits will have an attack, has frequently proved sufficient to produce one. Madame de St Amour attained great reputation in France, within the last half century, for the power she exercised over nervous diseases. It is related that on one occasion a young woman was brought to her, when she demanded, "What is your complaint?" "Epilepsy," replied the girl. "Then, in the name of the Lord, have a fit now!" exclaimed Madame de St Amour. The effect was instantaneous. The patient fell backwards, and had a violent attack of epileptic convulsions. Without Expectation, the simple thought or remembrance of previous attacks suffices with some epileptics to cause a recurrence of the fit; and still more potent is the recollection of the cause, if the cause has been of an alarming character. Ideal Emotion simply takes the place of the original feeling. In Van Swieten's works is recorded a case of epilepsy which may be referred to this principle, that of a boy who, having been frightened into epileptic fits by a great dog, had

a recurrence of the attacks whenever he heard a dog bark.

The mischievous influence of Sympathy or Imitation is exemplified in the following case which occurred at Lyons. The 'Journal des Connaissances Médico-Chirurgicales' (16th February, 1851) treats such occurrences as "excessively rare in the annals of physiology." They certainly are not frequently reported, but occur more frequently than would be supposed from this circumstance. In a workshop where sixty women were at work, one of them, after a violent altercation with her husband, had a nervous attack. Her companions pressed round her to assist, but no sooner had they done so, than first one and then another fell a prey to the same kind of attack, until twenty were prostrated by it. The contagion appeared likely to spread through the company, but was checked by clearing the room. The reporter in the above journal, in adding that there are few precedents, remarks that history, in fact, scarcely presents more than two, the famous scenes in the Cemetery of St Médard, and the occurrence in Boërhaave's practice which is so well known. Illustrations of the pernicious influence of this principle in connection with witnessing or reading the reports of atrocious crimes, as in the 'Police News,' will occur to the reader, and need not be detailed here, as they do not constitute such good examples of bodily effects from Sympathy as those just referred to, though striking evidences of a blind instinct depending for its beneficial operation upon the control of reason and the moral sense, but, lacking these, leading simply to a mischievous reproduction of acts, the images

of which are impressed on the mind through one or other of the senses. From what but the unreasoning operation of this law, excited by an association of ideas, could it happen that, when a sentinel of Napoleon's army committed suicide by hanging himself in his sentry-box, several immediately followed his example when they became his successors in the same box? What a practical commentary on this imitative principle of the mental constitution, that, to prevent further mischief, Napoleon found it necessary entirely to destroy the box by fire. Such facts demonstrate in strong colours the duty of not neglecting the idiosyncrasies of men and women as regards the association of external forms and internal images. Often what we call idiosyncrasies are the workings of a universal principle acting exceptionally in consequence of the absence of certain modifying influences—a principle underlying a thousand acts, unsuspected or unrecognised until exposed by the removal of its ordinary safeguards.

Cases of spasmodic action of the pharynx, more or less assuming the form of hydrophobia, and of mental origin, are more likely to arise from a powerful Emotion than an intellectual act, and will be given under that head. One case, however, may properly be given here. Dr Ferriar in his 'Medical Histories and Reflections' (vol. iii, p. 46), treating of *Rabies Canina*, observes:

"Dr Percival has justly remarked in his letter to Dr Haygarth that the difficulty of swallowing is sometimes produced by the power of Imagination alone. I met with an instance of this kind lately in which it was very difficult to prevent a person from rendering himself com-

pletely hydrophobic. Himself and his wife had been bitten by a dog which they supposed to be mad. The woman thought herself well, but the man, a meagre hypochondriacal subject, fancied that he had uneasiness in his throat, *and that he could hardly swallow anything*. When he first applied to me, a medical friend who was present asked him whether he had any sensation of heat at the pit of the stomach. He answered in the negative doubtfully; but next day I found him in bed, complaining of heat at the pit of the stomach, difficulty of swallowing, tremors, and confusion in the head. He continued to persuade himself he was ill of rabies, and confined himself to bed, expecting death for nearly a fortnight. At last I remarked to him that persons who were attacked by rabies never survived more than six days; this drew him out of bed, and he began to walk about. By a little indulgence of his fears this might have been converted into *a very clear case of hydrophobia*, and the patient would probably have died."

It is important to remark that, as pointed out by many medical writers, but by no one so forcibly as by Rush, the mere *mention* of water will in a hydrophobic person induce the recurrence of the symptoms. The image—the Imagination—causes the same effect as the attempt to swallow water. Since consciousness may or may not be present, it may seem to be a misnomer to speak of the influence of mind at all upon the body. But at any rate, in reference to the cases which are now under consideration, the condition of consciousness is implied, for it is by reaching the hydrophobic patient's consciousness, by mentioning to him water, by the induction of a defi-

nite idea in his mind, that the first change in the series of phenomena is excited. That ideaginous changes (paradoxical as the statement is) may take place without an idea is, no doubt, true when properly understood. It sometimes happens that the term "consciousness" is employed in different senses, and confusion is occasioned. Thus, there may be a state of the hemispherical and sensory ganglia, as in somnambulism, in which there is apparently unconscious sleep, but the centres respond to an idea introduced into the mind, and one says that the individual is conscious of this particular impression. But in the ordinary sense of consciousness this may not be true. The fact is, one person assumes that to have an idea is to be conscious; and another, that an idea may be present as an excito-motor, without the mind being conscious. The terms consciousness and impressibility are frequently confounded together. That the brain may act in a reflex or automatic manner, without consciousness as it is ordinarily understood is indisputable; but that the brain, in regard to that which is conveyed to it from without, must be impressible, is equally clear. If a man's cerebral hemispheres are so thoroughly asleep that no impression can reach them, it is clear that no idea, understood as a state of conscious mind, can be excited; the sensorial ganglia can alone respond to impressions made through the senses. That, however, the hemispheres may be in a state in which they respond to impressions conveyed to them from without, or that a latent idea (so-called) may excite movements, without the person being conscious in the popular sense of the term, is that which can and does happen. If a man, who is

hydrophobic, has an apoplectic fit, and consciousness is abolished, the spinal cord may act, the sensory ganglia may act, but no "mention of water" will excite the characteristic spasm. Restore consciousness, and the mention of water has its effect. In this and similar cases consciousness is clearly a condition. In the epileptic woman, Madame St Amour's command that she should have a fit would have had no effect without consciousness.

Under this Section fall those cases of cataleptic rigidity which occur in certain susceptible states of mind from the influence of Expectation. In the following illustration the effect of what is usually called Imagination, which is here synonymous with Expectation or Expectant Attention, is admirably exemplified apart from the particular muscular affection which resulted. "I had heard much," says Mr Braid (xx, p. 82), "of an interesting case of a highly susceptible lady, so susceptible to ordinary mesmeric passes that she might be sent off into the sleep by the most simple attempt to produce it, and so sensitive of the influence of magnets that she was quite uncomfortable if a magnet were near her in any room, and in the dark she could point out any part of the room where a magnet of very moderate power was placed, from her seeing the light it produced streaming all around it. I was kindly invited to spend an evening at this lady's house to afford me an opportunity of seeing and hearing more particulars of these wonders. I had the pleasure of sitting very near the lady, and of enjoying a long and interesting conversation with her and her husband, and no manifestation whatever took place during the whole time until after I had explained my views regarding the

power of an act of *fixed attention*, directed to any part, in modifying the natural condition of the part so regarded. She was requested to direct her fixed attention to her hand, and watch the result, without anything being done either by her husband or any one else. She did so, and very quickly fell asleep, *and the arm to which she had directed her attention became rigidly cataleptic.*" Mr Braid it must be added, had a fourteen-pound-lifting magnet, with the armature unattached, in his side pocket next to the lady.

SECTION III.—Loss of Muscular Power; Paralysis.

The simple belief or conviction that a muscle cannot be contracted or relaxed is sufficient in a sensitive person, or in one in whom this sensitiveness is induced, to cause temporary loss of power. It is referred to the Imagination; in other words, the effort to carry out the desire or will is paralysed by the absorbing conviction that it will be ineffectual.

Dr Gregory gives the case (a very common one) of Mr W—, an officer, "biologised by Dr Darling, whose muscular motions were controlled in every possible way. He was rendered unable to raise his hands or let them fall; he was made unable to move one while he could move the other; unable to sit down or to rise up; or to take hold of or let go an object" (xix, p. 353).

In the following curious case, the influence of expectation, the conviction of inability to use the muscles engaged in articulation, is well exhibited:

"In Kleische, a small village in Germany, belonging to Mr V. S—, a maid servant of that gentleman's family was sent a short league from home to buy some meat. She executed her orders correctly, and as she was returning in the evening, she thought she suddenly heard a great noise behind her, like the noise of many waggons. Upon turning round she observed a little grey man, not bigger than a child, who commanded her to go along with him. She did not, however, return any answer but continued to walk on. The little figure accompanied her, and frequently urged her to go along with him. Upon reaching the outer court of her master's residence, she was met by the coachman, who asked her where she had been, to which she returned a very distinct answer. He did not remark the little man, but she still continued to do so. As she was passing the bridge, he summoned her for the last time, and upon her refusing to answer him, he told her with a menacing look, that she should be four days *blind and dumb*, and having said so he disappeared. The girl hastened to her apartment, and threw herself on the bed, *unable to open her eyes, or to pronounce a word*. She appeared to understand all that was said, but could not make any answer to the questions which were proposed to her, except by signs. Everything was tried for her recovery by the family with whom she lived, but all was in vain. She was incapable of swallowing the medicines which were ordered for her. At last, *on the expiration of the fourth day*, she arose in tolerably good health, and narrated what had happened to her" (lxiii, ii, p. 15).

Professor Bennett records, on Professor Christison's authority, two cases which appear to be illustrative of the

influence of a mental state unconnected with emotion or with organic disease upon the power of locomotion. "The first was that of a gentleman who frequently could not carry out what he willed to perform. Often on endeavouring to undress he was two hours before he could get off his coat, all his mental faculties, volition excepted, being perfect. On one occasion, having ordered a glass of water, it was presented to him on a tray, but he could not take it, though anxious to do so, and he kept the servant standing before him for half an hour, when the obstruction was overcome. In the other case the peculiarity was limited. If, when walking in the street, this individual came to a gap in the line of houses, his will suddenly became inoperative, and he could not proceed. An unbuilt-on space in the street was sure to stop him. Crossing a street also was very difficult, and on going in or out of a door he was always arrested for some minutes. Both these gentlemen graphically described their feelings to be 'as if another person had taken possession of their Will'" (xviii, p. 16).

Demangeon (lx) cites from De la Roque's 'Journal de Médecine' the following case:—A woman saw a man with a paralysed arm without any ill-effects; but, subsequently, on recalling the circumstance, her arm felt numb. On attempting to take up a bottle of brandy she was unable to grasp it, and let it fall. One side of the body became paralysed. Alarmed, and afraid of losing all power, she soon experienced a general loss of feeling and motion. An emetic was administered, and she was bled. On recovering from the seizure she explained, as above, the circumstances preceding the attack. We are not

informed whether the symptoms entirely passed away or not. It is much more likely to have been simply a case of hysterical paralysis, than an oncoming attack of real paralysis hastened by the mind dwelling upon the man's palsy.

Hysterical affections of the joints are good examples of morbid conditions arising from the imagination, but are usually more or less emotional states. Sir B. Brodie observes, "the symptoms may frequently be traced to the circumstances of the patient's *attention* having been anxiously directed to a particular joint."

Sir James Paget in his 'Clinical Lectures and Essays,' commenting on Brodie's statement that at least four fifths of the female patients among the higher classes of society, supposed to labour under diseased joints, only labour under hysteria, observes that among his hospital patients, in and out, the proportion of nervous joints has been less than one-fifth. He finds the hip and the knee, which are the most frequent seats of real disease, to be equally so in the mimicked cases; next in order, but rarely, the tarsal and carpal joints, or the elbow and shoulder (xlix, p. 204).

Actual paralysis from hard and prolonged intellectual labour should here be noted as a not impossible result. In many of the cases which come under our notice, there are other causes at work, such as anxiety, disappointed ambition as to literary fame, impecuniosity, &c., and no doubt it would be difficult to find a case of purely intellectual paralysis. At the same time excessive exercise of the reasoning powers must be accompanied by danger. It would be interesting to have some estimate of the

number of literary men who succumb to paralytic affections, although, for the reason stated above, open to considerable fallacy. It may be remarked that these cases of paralysis do not, as a general rule, come on suddenly, but, as Dr Richardson truly observes, are preceded by significant warnings, the most striking being "a sensation on the part of the patient of necessity during any mental effort for frequent rest and sleep ; symptoms such as are described so faithfully by Johnson as belonging to the case of the poet Cowley. The cause of these cases is usually clear ; it is a progressive course towards general palsy of mind and body, and it is not unlike the decline of mental activity in the age of second childishness and mere oblivion. When this condition exists, at however early a stage, the slightest shock tells on the nervous structures and transforms suddenly the threatening malady into the extreme reality. Sudden muscular paralysis is the most common sequence of shock under this condition ; it is in most cases at first a local paralysis, but it may at once be general in respect to all the muscular system under the control of the centres of volition " (' On Physical Disease from Mental Strain,' xxi, 1869, p. 360).

Gall records the case of a man who had been partially cured of a wound in the brain, and in whom, if the exertion of mind was prolonged, "the whole of one side was paralysed" (xxii, ii, p. 115).

In Sir James Paget's chapter on "Nervous Mimicry," or Neuro-mimesis, from which the foregoing reference to hysterical joints was cited, he records a case of functional paraplegia as a very striking illustration of the effect of mental strain. "I saw one day," he says, "a young

gentleman who had been over working for a Civil Service examination. After a three hours mathematical cram he fainted, and when he rallied, had a very close mimicry of paraplegia, which lasted many weeks" (xlix, p. 200).

The following observation made by this surgeon is entirely in accord with the fact that a great man like Hunter could easily induce psycho-physical phenomena in his own person: "Nothing can be more mischievous than a belief that mimicry of organic disease is to be found only or chiefly in the silly, selfish girls among whom it is commonly supposed that hysteria is rife or an almost natural state. It would be safer for you to believe that you are likely to meet with it among the very good, the very wise, and the most accomplished women (xlix, p. 185).

CHAPTER IV

INFLUENCE OF THE INTELLECT UPON THE INVOLUNTARY
MUSCLES

THE Intellect acts upon the Heart and non-striated muscles with a power similar to that which it exercises over the voluntary or striated muscles, causing co-ordinate Movements, Spasm and Paralysis.

Heart.—The direction of thought to the Heart has, very generally, an embarrassing influence upon its regular action. It is true, emotional states exercise a much greater and more instant influence; but simple attention to its beats is usually attended by slight, and occasionally by painful, cardiac disturbance. This action of an intellectual, as distinct from an emotional, state is referred to by Sir H. Holland: "There is cause to believe the action of the heart is often quickened, or otherwise disturbed, by the mere centering the consciousness upon it, without any emotion or anxiety. On occasions where its beats are audible, observation will give proof of this, or the physician can very often infer it while feeling the pulse; and where there is liability to irregular pulsation, such action is seemingly brought on, or increased, by the effort of Attention, even though no obvious Emotion be present" (xvi, p. 17).

From the same cause, medical students when their thoughts are directed by their studies to this organ, are frequently sufferers from its disturbed action. Anxiety no doubt comes in here to aggravate the disorder, and will be referred to again under Emotion. Peter Frank himself, even when in advanced life, is stated by Romberg to have been attacked while devoting especial attention to the subject of heart disease during the preparation of his lectures, with such severe palpitations, accompanied by an intermittent pulse, that he felt assured he was affected with an aneurism; the symptoms only ceased after the completion of his labours, and after he had enjoyed the relaxation and diversion of a journey (xxxiv, ii, p. 6).

It is a common remark that medical men frequently die of the disease to which they have devoted special attention. When the coincidence occurs the two circumstances are likely to be placed in the relation of cause and effect without sufficient reason. There is nothing, however, improbable in the popular impression; for a very slight symptom referrible to the organ especially studied by the physician would concentrate his attention upon it, and would be likely to aggravate any previous mischief, and in the case of the heart induce irregular action and ultimately hypertrophy, or some other decidedly organic affection. And yet, probable as this seems, do not a large class of facts appear difficult to reconcile with the supposition? How explain the impunity with which thousands of hysterical persons fancy and firmly believe that they have a particular disease, dwell anxiously upon it night and day, and yet

escape without any organic disease whatever? What proportion of medical students have heart disease out of those who after having their studies directed to cardiac maladies fancy they are themselves affected? A small one, we believe. Dr. Armstrong said in one of his lectures, "You will seldom be alarmed at hypochondriasis when it occurs in young subjects. I have, since I have lectured here, had the honour of curing some pupils of extraordinary and dangerous organic diseases by very slight means. I have cured an aneurism of the aorta by a slight purgative, ossification of the heart by a little blue pill, and chronic disease of the brain by a little Epsom salts!"

It must therefore be allowed that while attention to the action of the heart embarrasses its action, and while if disease be actually present, it proves mischievous, there is very little evidence to prove that in a healthy organ it would induce more than functional disturbance.

Nowhere are the pathological effects of the Imagination upon the valetudinarian better satirised than in 'The Spectator' of March 29th, 1710-11, in which the writer of a letter confesses that he first contracted his ill habit of body, or rather mind, by the study of physic. He said that he no sooner began to peruse books of this nature than he found his pulse irregular, and scarce ever read the account of any disease that he did not fancy himself afflicted with. Dr Sydenham's learned treatise on 'Fevers' threw him into a lingering hectic, which hung upon him all the while he was reading that excellent piece. "I then," he continues, "applied myself to the study of several authors who have written upon Phthisical Distempers, and by that means fell into a consumption,

till, at length, growing very fat, I was in a manner shamed out of that Imagination. Not long after this I found in myself all the symptoms of the gout, except pain, but was cured of it by a treatise upon the 'Gravel,' written by a very ingenious author, who (as it is usual to convert one distemper into another) eased me of the gout by giving me the stone."

There are many interesting cases of failure of the heart's action from states of mind which it is not always easy to analyse and to decide upon as regards their emotional or intellectual character. Thus, if a person undergoes a sham operation of venesection, and believing that fainting will be the result, faints, we may be in doubt how far Fear has caused the result. Thus, some years ago, a medical student in Paris, on being initiated into the mysterious rites of a Masonic Society, was subjected to the above process. His eyes were bandaged, a ligature bound round his arm, and the usual preparations made to bleed him. When a pretence of opening the vein was made, a stream of water was spurted into a bowl, the sound of which resembled that of the flow of blood which the student was anticipating. The consequence was that in a few moments he became pale, and before long fainted away. Gratiolet, who relates the story, does not say whether he inquired into the proportion of cases in which syncope was caused by passing through the ordeal of membership. There is a case on record of a man who was sentenced to be bled to death. He was blindfolded, the sham operation was performed, and water allowed to run down his arm in order to convey the impression of blood. Thinking he was about

to die, he did actually die. Imagination had the same effect as the reality. But it is impossible to say how much Fear had to do with it ; probably a good deal, as in the instance of the man reprieved, after his head had been laid on the block, and the fatal axe was about to fall. The reprieve came too late. The anticipation of death had arrested the action of the heart. Death predictions belong to the class in which Fear may enter largely, and yet in some instances it seems to have been simply a strongly impressed idea, unattended by Fear. How far, however, death happens through arrest of the heart's action one cannot say, but this seems by far the most likely cause. Probably it was so in the following case :—

A lady, the daughter of Sir Charles Lee, died at the hour foretold by an apparition. Believers in the reality of ghosts will perhaps not dispute the fitness of such a case as an illustration in point, if we suggest that even a supernatural visitant might, by this principle, bring about the event. The apparition, that of a little woman, appeared between her curtain and pillow at 2 o'clock, and assured her that by 12 o'clock that day she would be with her. "Whereupon," says the narrative (xxv, xxvi, p. 262), "she knocked for her maid, called for her clothes, and when she was dressed went into her closet, and came not out again till nine, and then brought out with her a letter sealed to her father, brought it to her aunt, the Lady Everard, told her what had happened, and declared that as soon as she was dead it might be sent to him. The Lady thought she was suddenly fallen mad, and therefore sent presently away to Chelmsford for a physician and surgeon, who both came immediately, but

the physician could discern no indication of what the Lady imagined, or of any indisposition of her body ; notwithstanding, the Lady would needs have her let blood, which was done accordingly. And when the young woman had patiently let them do what they would with her, she desired that the chaplain might be called to read prayers ; and when prayers were ended, she took her guitar and psalm-book and sat down upon a chair without arms, and played and sung so melodiously and admirably that her music master, who was then there, admired at it ; and near the stroke of twelve she rose and sat herself down in a great chair with arms, and presently fetching a strong breathing or two, immediately expired, and was so suddenly cold as was much wondered at by the physician and surgeon. She died at Waltham in Essex, three miles from Chelmsford, and the letter was sent to Sir Charles at his house in Warwickshire ; but he was so afflicted at the death of his daughter, that he came not until she was buried ; but when he came he caused her to be taken up, and to be buried with her mother at Edmonton, as she desired in her letter."

It may be observed that, assuming that a morbid condition of the brain caused the apparition, the same condition would be a fitting one for the fatal impression received from the creation of its own fancy. Whether lowering the system by the removal of blood would add to the power of resistance may well be doubted. Probably a powerful stimulant would have saved life.

Further, is it not very possible that her condition after all was one of trance and not actual death ? That she was in a partially somnambulistic state is further suggested

by her increased musical ability, her master evidently being unaccustomed to such a display.

I defer speaking of the probable channel through which the Intellect affects the heart until the Emotions are treated of, and pass on to the lungs and blood-vessels.

Lungs.—The functions of Respiration, are so closely connected with the Heart that the influence of the Intellect upon them may be referred to here, although involving the action of the voluntary or, as they are appropriately called, the semi-voluntary muscles. As is well expressed by Mr Wilkinson (xlix, pp. 108—15)—“The breath awaits while the steady-fingering thought explores, and then inspires, not whatever comes, but precise information. Let the reader observe himself when he is feeling for such information, and he will find his curiosity rejoicing in periods of suspended lungs. . . . We *hear* best in breathless attention, and *see* most observantly when the eye-thought gazes unshaken and unprompted by the lungs. It is also to be noticed that the *voice*, which consists of perceptions freed from the mind and launched into the air, is made of the material of the expirations. The mind is breathed out into the social world by the expirations and their pauses, and not by the inspirations. . . . The Imagination, which is the intellect of the passions, builds especial houses in the breath, or, as it is said, forms air-castles. These are its own expirations, in which it revels, for what it draws in is nothing to it, but what it breathes out is all. It does not, however, expire either to do or to die, but to run after its breaths as they sail through the air; not desiring

to leave the world, but to propagate its image children in the universal imagery." The same writer also makes some observations on the relations between the exercise of thought and respiration which are true to nature. "Thought is still, and contemplation breathless; each involving, first, fixed breath, and, second, a small expiring; and so on, until the thought is traversed, or the effort ends and begins anew. . . . To the senses, suspended animation is suspended consciousness; to the intellect suspended animation may be life, thought and supreme wakefulness. . . . Intellect touches so near upon trance, that the highest cases of either involve common phenomena, and exist in the same persons."

Several striking examples of respiratory spasm assuming the characters of croup occurred in 1880 in the Pennsylvania University Hospital and have been recorded by Dr Weir Mitchell (1, p. 71). The patients were children in the Church Home for children, and these attacks were induced by imitation of other children. One child of ten was supposed really to have a sharp attack of croup; her breathing was hard, gasping, crowing; she was speechless, and wildly clutching at her throat. When free from spasms, "the approach of a nurse with medicine, or the visit of a manager to the Infirmary started her off anew." Six or seven inmates became affected in the same way. They rapidly recovered when scattered about in different hospitals (1, p. 74). The mimicry of disease in these cases was well exemplified.

Blood-vessels.—Sir Henry Holland, in the Essay already referred to, observes that he has reason to think that "hæmorrhage (as in the simple case of epistaxis) is often

increased by Attention, but whether by excitement to the heart's action or by direct influence on the vessels of the part cannot easily be decided. Concentrated attention, moreover, will frequently give a local sense of arterial pulsation where not previously felt, and create or augment those singing and rushing noises in the ears, which probably depend on the circulation through the capillary vessels."

The singular phenomena of Stigmata may be fittingly referred to here, for so far as they are genuine and not caused by mechanical irritation, they arise from the mind's influence on the capillary circulation through the vaso-motor nerves. No one has treated the subject in a more luminous manner than M. Alfred Maury, who forcibly observes that ecstatic mysticism, including these remarkable appearances, is "the most striking proof of the influence of the Imagination upon the body, and is truly a miracle, in the sense of being one of those marvellous effects of the laws of thought, whose secret escapes and whose extent confounds us." He admits the fact of stigmatisation (after making the allowance he considers necessary for imposture and exaggeration), and explains its occurrence, so far at least as the reference of the phenomena to a certain group of psycho-physical facts may be regarded as an explanation, by a consideration of the influence of dreams upon the skin. In mentioning those cases in which persons have dreamed that they received blows or wounds, and in the morning have found marks of inflammation on the body, and which sometimes, in the course of a day or two, become ulcers, he observes that "just so with visionaries, under the power of the

Imagination, by the concentration of the Attention, the blood is directed to the place where they fancy they are affected" (xxxv, 1855).

M. Maury's description of the experience of St. Francis d'Assisi, whom he regards as the ancestor of the stigmatised, is much to the purpose. We shall make free use of it here. One day when exhausted by fasts and absorbed in reverie and prayer, he imagined that God ordered him to open the Gospels in order that he might there learn His will. "Open me the Holy Book," he exclaimed to a friar. Three times was this done, and three times it opened at the account of the Saviour's Passion. St. Francis regarded this as a proof that he must carry his imitation of Christ much further than he had hitherto done. Bodily mortification he had doubtless practised, and had crucified his desires, but he had not yet subjected his body to the sufferings of the cross, the penance now evidently required by the Almighty. One thought, one definite idea, henceforth occupied him—his Master's crucifixion. His Imagination revelled, so to speak, in all His sufferings. He strove while fasting more and more, and praying more and more intensely, to realise them himself. On the anniversary of the Exaltation of the Cross, resigning himself more than ever to one of these ecstatic contemplations, he imagined he saw an angel descend from the vault of heaven and approach him, the hands and feet attached to a cross. As St. Francis contemplated this vision, full of profound delight and astonishment, the seraph suddenly vanished. But the pious anchorite experienced from this spectacle a strange reaction, and his whole system was more than ever permeated

with the idea of the realisation of the physical sufferings of Christ in his own person. He then suffered pain in his hands and feet, and this, we are told, was succeeded by inflammation so severe as to terminate in ulceration. These wounds he regarded as the stigmata of the Saviour's passion.

It might not be safe to take this or any other saintly narration as a *proof* of so remarkable an influence upon the body, but when viewed by the light of facts coming within our own knowledge, we have I think, no sufficient reason for rejecting the major portion of such an experience as this. So clearly defined an idea, so ardent a faith intensifying its operation, were sufficient to reflect it upon the body. We may accept some physical result, instead of soiling the fair fame of St. Francis d'Assisi with the charge of pious fraud—always an easy escape from scientific difficulties, but one which, we venture to say, will be less and less resorted to, as the sole explanation of puzzling phenomena, as we understand better the delicate *nexus* which unites body and mind in inseparable union.

The periodicity of stigmata is a further interesting illustration of the influence of attention and imagination upon the direction and localisation of the cutaneous circulation. On saints' days and on Fridays, the seat of the marks became more painful, and a brighter colour indicated a fresh afflux of blood to the part; the mystic's thoughts being specially concentrated upon the passion.

Since the first edition of this book was published, the case of Louise Lateau, the "Stigmatisée" of Bois-d'Haine Hainaut, Belgium, a young woman of twenty-four at the

time when the appearances here described were recorded, has attracted much notice. The Royal Academy of Medicine of Belgium appointed a Commission to decide whether an article by M. Charbonnier, entitled "*La maladie des mystiques: Louise Lateau*," should appear in one of the Academy's publications. This Commission consisting of MM. Fossion, (who did not act) Mascart, and Warlomont, deemed it necessary in order to form a satisfactory opinion, to examine Louise herself. The report of this medical commission, engaged for five months in the investigation, is the best authority* we are likely to have as to the real facts of the case. Is it a fact that she manifested the stigmata? If she did what is the explanation arrived at by the Commission? Does it accord with the principles applied to the explanation of other phenomena detailed in this work?

It should be premised that from her infancy, Louise was constantly given up to religious exercises. She had a special devotion "pour les douleurs du Golgotha." Long before her first communion, which took place when she was eleven, "Elle savait méditer sur les grands mystères, bien qu'elle n'eût appris de personne la méthode de la méditation. Toute petite, elle aimait à répéter les doux noms de Jésus et de Marie; elle avait une grande dévotion pour la passion du Sauveur, faisait souvent le chemin de la Croix, assistait assidûment à la Sainte Messe, et priaît depuis longtemps son chapelet chaque

* M. Warlomont takes Descartes' precept as his guide, "Ne tenez jamais une chose pour vraie que vous ne la sachiez vraie, et faites partout des dénombrements si parfaits et si complets que vous soyez sûr de n'avoir rien omis."

jour.”* One night April 15th 1868, she fell into a state of ecstasy, and continually talked in a religious strain. She saw the Virgin, and several of the saints. This condition lasted till the 21st and was followed by the appearance of the stigmata. Blood oozed from the left side on Friday the 24th, it returned on the Friday following when blood also transuded from the feet; and on the following week from the palms of the hands likewise. Lastly, on the following Fridays, these hæmorrhages returned, until Sept. 25th, when for the first time, blood flowed similarly from the forehead. The attack, as it is called, lasted at first seven or eight hours, but at the time of the Commission only two hours and a half. While it lasted, Louise “became insensible to all external stimuli, appeared to be present at the drama of Golgotha, and revealed by a well-marked mimicry the emotions by which her mind was affected” (xlviii, p. 15).

M. Warlomont's report commences with the 18th Sept. 1874. He gently removed the dried blood which he found on the forehead, and on examining the skin with a lens he failed to discover any scratch, but only some brown points resembling particles of coagulated blood. The skin was shining and remained clear after being washed, the rest of the day. On examining the hands he found sanguineous spots, the blood flowing at the time so continually that it was difficult to see clearly the bottom of the wound, but examined by a lens the papillæ of the skin were found to be red and swollen, resembling fleshy pimples. The feet were not so care-

* ‘Louise Lateau, la Stigmatisée de Bois d'Haine’ p. 13. Bruxelles, Closson et Cie., 1873.

fully examined, and the side not at all. On the right shoulder was a wound, presenting drops of serum scarcely tinged with blood. A priest then administered the sacrament, Louise kneeling on the stone floor, with her eyes closed, and her hands crossed, over which the communion cloth was extended. Then she passed into an ecstatic form of hypnotism; her immobility resembled marble, her eyes were closed. On raising the lids, the pupils were found to be widely dilated, fixed, and insensible to light. On handling the parts surrounding the wounds, which before had been painfully sensitive, there was not the slightest indication of suffering. Pinching the skin elicited no sign of feeling; in fact there was everywhere complete anæsthesia, with the exception of slight sensitiveness of the cornea. The pulse which before was 120, fell to 100. When she returned to consciousness she appeared to be coming out of a deep sleep. The blood was still oozing from the wounds. The sensibility gradually returned. The pulse rose again to 120. The muscular sense was abnormal; the patient not knowing without looking, in what position a limb was placed.

Louise passed into a state of ecstasy at an expected time—a quarter past two o'clock in the afternoon. Before doing so the pupils were slightly contracted; the eyelids almost closed; the eyes expressionless. When, however, the ecstatic crisis had commenced, the eyes, open and dull, were fixed upwards, and directed to the right, the pupils dilated and almost insensible to light. She knew nothing of what was going on around her for a couple of hours. This was the *first* stage; the *second* was that of genuflexion, in which she clasped her hands and

remained in the attitude of contemplation for a certain time. A *third* stage was marked by the patient prostrating herself upon the ground, without any rigidity. After a while she made a rapid movement, the arms were extended in the form of a cross, and she remained in one attitude for an hour and an half.

During the ecstasy, the flow of blood from the stigmata was considerable; the skin insensible.

The pulse fell to 70 in the third stage, and was scarcely perceptible; the respirations became very slow, and the respiratory murmur feeble.

On one of these occasions the late Mr Critchett was present. His son (Mr G. A. Critchett) informs me that he was satisfied of the genuineness of the phenomena, and attributed them to vicarious menstruation.

M. Warlomont constructed an apparatus in which the right hand was enclosed for twenty hours before the wounds appeared, and every means appears to have been taken to render it impossible for Louise to obtain access to her hand, the nails being also carefully cut close. Still the hæmorrhage occurred. The blood was examined under the microscope.

The conclusion arrived at as regards these ecstasies and stigmata was that simulation was altogether precluded. "The stigmata and the ecstasies are real. They can be explained physiologically" (xlvi, p. 193).

The explanation offered by M. Warlomont is fully in accordance with the psycho-physical laws recognised in these pages, and also the suggestion made by Mr Critchett. I may add, that in a recent letter from M. Warlomont he informs me that he has seen no reason

to alter his views. The profane are not now allowed to study the case.

There was, then, the long preparative stage of constantly dwelling upon one set of ideas—ideas definitely associated with certain localities of the body, in a neurotic girl. Concentration thus localised was followed by vasomotor disturbance and congestion of the spots to which the thoughts were so intensely directed. Not only might passive transudation of blood occur at last, but the irritation occasioned would inevitably lead the girl to rub the skin and so greatly aid the tendency to hæmorrhage. Then, again, the condition of ecstasy would serve to accentuate the determination of blood to the affected parts, not only by the peculiar effect produced on the circulation as shown by Braid, but also by the association established in Louise Lateau's mind between this state and the stigmata.

The periodicity of the stigmata is rationally accounted for by the ideas with which they originated having been associated with certain days; and by the weekly direction of thought and feeling in the same channel.*

* Cf. among other works bearing on this subject:—'Louise Lateau, sa vie, ses extases, ses Stigmates; Étude médicale.' Louvain, 1873. Par Lefebvre, Professeur à l'Université Catholique de Louvain. 'Les Stigmatisées' (Louise Lateau, Sœur Bernard de la Croix, etc.). Paris, 1873. Par A. Imbert-Gourbeyre, Professeur à l'École de médecine de Clermont-Ferrand. 'Biographie de Louise Lateau, la Stigmatisée de Bois d'Haine.' Par Van Looy. Tournai, Paris, Leipzig, 1874. 'Louise Lateau, la Stigmatisée, d'après des Sources Authentiques, médicales et théologiques.' Par H. Rohling. Traduit de l'Allemand, par le Dr. Arsène de Noné, Bruxelles et Paris, 1874. 'Louise Lateau, ihre Wunderleben und ihre Bedeu-

The relation of the intellectual operations or the functional activity of the brain to the condition of that organ during *sleep*, is a subject of great interest and requires some notice when we are considering the action of mental states on the blood-vessels. There are two aspects of the question which present themselves, *first* the possibility of the intellect causing the condition of sleep, and *second* the absence of intellectual activity, in other words the condition itself. It will be most convenient to consider the second point first, and then to see how far we can imagine on theoretical grounds, sleep being induced as indicated in the former proposition.

From the undoubted fact that deep sleep is a condition of cerebral inactivity, it has been hypothetically assumed that the blood supply to the brain in that condition is diminished, and the proof of this position was afforded by various authors as Durham, Moore, &c. At the same time this can hardly be considered to express the whole physiology of sleep, since partial anæmia of a nerve centre is followed sometimes by convulsions, while in

tung im deutscher Kirchenconflicte. P. Mayjuncke. Berlin, 1875. In the above-mentioned pamphlets the case is described from a theological point of view, and regarded as miraculous. 'Science et miracle. Louise Lateau ou la Stigmatisée belge.' Par Bourmeville. Paris, 1875. 'Les miracles' ('Revue des Cours Scientifiques,' 1875). Virchow. In these works, as in Warlomont's, miracle is doubted, and the phenomena are attributed either to a morbid state or to deception. Legrand du Saulle, in his recent work, 'Les Hystériques' (lii, p. 152), observes that stigmata in general belong to the group of "hématidroses." I am much indebted to M. Morel, of Gand, for valuable information in regard to L. Lateau.

addition, the first stage of sleep is evidently connected with changes which have gone on in the nerve corpuscles of the cortex of the brain, since the necessity of sleep arises at a point when the corpuscles are in a state of fatigue—the state of the circulation remaining unaltered. But even this enlarged consideration of the problem cannot be accepted as expressing the whole process carried on in the brain, for it is a matter of common observation that, supposing the muscular system to be fresh and unwearied, the cerebral corpuscles will continue to work for a very considerable time without the necessity for sleep making itself felt; while, on the contrary, it is a matter of every day experience that physical exercise is the most powerful cause of profound slumber. So that on the whole it is not improbable that under ordinary circumstances the physiological conditions attendant on the first stage of sleep are, on the one hand, fatigue of the cerebral corpuscles, and on the other, the increased percentage of carbonic acid and excretory products in the blood.

This broader view of the physiology of sleep does not lose sight of the co-existence of partial anæmia of the nerve centres, since this necessarily results from their inaction. Although no doubt the vaso-motor centre in the medulla helps to determine the calibre of the cerebral vessels, it is not necessary to assume that its primary stimulation occurs until the activity of the cortical corpuscles begins to diminish, the diminution of blood supplying the part being strictly comparable to the diminution of the blood-supply to a muscle at rest.

From this standpoint we may now consider more

fairly the question of the possibility of the intellect directly causing the condition known as sleep.

The cases in which sleep can be said to have been produced by intellectual effort are very rare, inasmuch as the instances which would occur to the reader, simply resolve themselves into the voluntary exclusion of sensory impressions, and thus the system is placed in a condition favourable to sleep, since sleep is a synonym for cerebral rest, while the operation of the intellect means cerebral activity. To assert the possibility of the former being immediately caused by the latter is evidently an assumption, and therefore, those instances on record, such as the case of Napoleon, which appear to favour it, may be regarded as only examples of what we have just stated, namely the adoption of such conditions as favour sleep.

It is true that one intellectual function, namely Attention, may be said to be followed by sleep, but here it results from cerebral exhaustion, and sleep, therefore, in this instance is only an indirect consequence of an intellectual process. Of the influence of Expectation we shall speak presently, and need only remark here that, although not so clearly in accordance with the above-mentioned principle, it would appear to resolve itself into a modified form of Attention.

If the foregoing views of the relation between mental action and the production of sleep be correct, their bearing will be recognised on Mr Durham's observations, and Mr Moore's ingenious theory of the causation of sleep, that the inhibitory action of the brain on the vaso-motor centre is suspended. Thus, if it is not proved that the cerebrum exerts an inhibitory action upon the sympha-

thetic, we may say that the usual influence of mental activity is to dilate the vessels, and that when exhaustion of the cerebral corpuscles occurs, and this stimulating action is withdrawn, the vaso-motor contractors come into full play and lessen the calibre of the cerebral vessels—a concomitant but not a cause of sleep.

Illustrations of the influence of Expectation (whether or not acting directly on the vessels) in causing sleep, and in inducing waking at a certain time, are not difficult to find. In many persons, as is well known, and as Sir John Forbes demonstrated, it is only necessary to expect sleep and it supervenes, while a person impressed with the idea that it will not come, may be rendered restless for hours. Dr Elliotson, in describing a case of mesmeric sleep in a female, says, "Mere imagination was at length sufficient, for I one day told her that I would retire into the next room and mesmerise her through the door. I retired, shut the door, performed *no* mesmeric passes, but tried to forget her, walked away from the door, and busied myself with something else—even walked through into a third room; and on returning in less than ten minutes from the first, found her soundly asleep, and she answered me just as was usual in her sleep-waking condition" (xxxvi, 1846, p. 47).

Mental hypnotics were found by Professor Laycock to be "singularly successful in those cases in which there is a morbid apprehension as to sleepless nights and a hypochondriacal anxiety for sleep." It is often the morbid feeling alone, as he observes, which prevents sleep, and he adds "this is proved by the circumstance, as repeatedly witnessed in my practice, that any simple remedy admi-

nistered to the patient so as to impress him with the conviction that it will cause sleep, is followed by sleep, and sometimes, when convalescence is approaching, by as prolonged a sleep as if a narcotic had been taken. In one case of this kind the long sleep which followed upon a *placebo* excited alarm" ('Edin. Medical Journal,' November, 1862).

Still more remarkable, the effect of a purgative pill has been rendered *nil*, and comfortable sleep induced in the place of insomnia, by the belief that an opiate has been administered. Such a case is related by Dr Noble, the pills consisting of Ext. Col. co., gr. viij, and Cal. gr. ij!

On the other hand, what is called "waking at will," must be referred to the influence of an expectant idea as much as going to sleep. Many persons can ensure waking in the morning at a certain hour by strongly fixing the attention upon the time desired just before falling asleep. This affords an excellent instance of mental activity, without consciousness of the process, the person being in fact asleep at the time the latent idea comes into operation. This familiar fact involves an automatic calculation of the lapse of time. The Fakir before passing into his hibernating trance determines when he shall awake, and strongly impresses upon his mind the day or even the hour when he shall revive; and revive he accordingly does. The late Sir James Simpson, at a meeting of the Edinburgh Medico-Chirurgical Society, referred to a striking case witnessed by three physicians, in which a person "biologised" was commanded to sleep thirty-five hours, and did so, "with two short intervals of permitted awakening" (xxiv, 1847, p. 486).

In this connection it may be observed that it is often much easier to act automatically, in getting out of bed, when tempted to indulge in further rest, than to bring the Will to act upon the muscles. I wake from sleep, and wish to rise. Reason strongly urges the act. The Will fails; not a muscle moves. Now, if I cease to endeavour to excite movements by volition, and divert my mind to another subject, I find that while thinking of something else, I am on my feet. A parallel case is the ease with which we often remember a circumstance or a name by not thinking of it, but of another matter, after fruitless efforts to recall it by the Will. As I write, a little boy vainly endeavours to remember the tense of a Latin verb. I make him change entirely the current of his thought, and suspend the action of the Will, and the forgotten tense comes back to his memory by automatic cerebral action. In Macgregor's 'Thousand Miles in the Rob Roy Canoe' occurs an incident which will illustrate the same principle. He says, "when on the Meurthe three women were seen on the banks of the river, in great alarm, who searched in vain for two boys supposed to have gone away to fish, but missing for many hours." They eagerly asked Mr Macgregor to tell them whether he had seen them, and implored him with tears to advise them what to do. "I tried," he says, "all I could to recollect; but no! I had not seen the boys, and so the women went away distracted, and left me sorrowful. But *suddenly*, when toiling in the middle of a very difficult piece of rock-work, lowering the boat [and therefore no longer trying to remember], *I remembered having seen those boys*, so I ran over the

fields after the anxious mamma, and soon assured her that the children had been safe an hour ago." Such are the involuntary operations of the cerebrum, when assisted by the suspension of the Will, as exhibited in these instances ; and still more strikingly, when in sleep, this unconscious activity, working to a definite end, produces those changes in the relative force of the sympathetic ganglia and the cerebro-spinal system by which the brain is restored to its waking state. Dr Cuthbert, in a letter to the 'Medical Times and Gazette,' November 5th, 1859, on the Ulster Revivals, observes in regard to the "subjects," that "one of their most remarkable endowments was the power of producing sleep, and of awaking at a specified time."

Dr Laycock, referring to the circumstance of young women in peculiar states of the system "stating the hour when a watch is placed to the nucha or epigastrium under circumstances such that the patient could not have previously known it," observes, "Somehow or other people know what o'clock it is when asleep, and without watch or clock near them ; and will awake at a time fixed on over night to the exact moment. I have myself more than once awoke within two minutes, and frequently within five minutes of the hour so fixed ; for instance, at three o'clock in the morning, when my usual waking hour was seven ; and I have awoke at the hour at once, from what has appeared to be a profound slumber. Now, something of this kind may occur in the cases alluded to above" (iv, p. 324).

The influence of mental states on the blood-vessels aids in determining a rise of *Temperature*. Dr Lombard who

commenced a series of experiments in 1866, with thermoelectric apparatus, on the temperature of the head when the mind is at rest, and in a condition of functional activity, demonstrated that the use of the higher intellectual powers was followed by a distinct rise of temperature in the head. Arousing the Attention alone sufficed to induce this result (xci, 1879, p. 3). Professor Schiff, in the following year arrived independently at similar results from observations made directly upon the brains of animals (xcii, t. iii, p. 6, 1870). Broca and Paul Bert arrived at the same conclusions (xxxii, April 19th 1879).

Dr. Lombard shows that although in every brain the performance of intellectual work may be supposed to be attended with thermal changes, yet these differ in different individuals, and in the same individual with different kinds of work. Two conditions are, he finds, usually essential to the production of heat appreciable on the outer surface; first that the work be continuous for some minutes; and second that the intellect operate with considerable intensity. Although however, these conditions combined are much more effective, prolonged application, not intense, may cause the same effects. It is very difficult to detect any rise of cerebral temperature in those who work leisurely. The intellectual work performed must be, Dr Lombard observes, "of a nature either to present some considerable difficulty in its accomplishment, or to decidedly interest the individual. For example, persons who are not in the habit of expressing their ideas in writing, may be made to raise the temperature of the head by earnestly endeavouring to write upon a given subject, even when the latter has been on the mind for

some time and has been fully discussed, the work being thus limited to the simple composition. Not so, however, with the brain accustomed to composition, even when the subject written upon is a difficult one. In like manner no effect is produced in persons accustomed to mathematical work, by giving them problems to solve or sums to compute, unless either the task be one of unusual difficulty, or, as in the case of the addition of figures, the condition of unusually rapid performance of the work be imposed. If the interest be strongly excited, good results are often obtained, although the amount of absolute intellectual effort may be comparatively small. This is illustrated by the effect, in some persons, of the reading of interesting books or of conversation of a like character." (xci, p. 123).*

The form of mental work in which the subjects were employed was as follows. (1). Mathematical calculations of considerable difficulty, performed rather slowly. (2). Arithmetical computations performed as rapidly as possible. (3). Making notes of subjects requiring considerable reflection. (4). Putting into writing, ideas difficult of expression.

It was found that in the individual experimented on, the greatest effect, both as regards degree and rapidity of rise of temperature, was caused by *composition*; the next greatest effect was caused by *rapid arithmetical computa-*

* "The first lesson to be taught the subject is to *stop thinking, at will*. Practice in this, and tact in the experimenter in diverting the mind of the subject from trains of thought, or in leading the mind into such trains, constitute a large part of the requirements of successful experimenting" (p. 123).

tions; and the least effect by *making notes*, (p. 132). But no rule can be laid down, for the degree of interest felt by the worker in different subjects of study, modifies the results.

With regard to the regions of the head in which the rise of temperature is most marked, Dr Lombard who in his first experiments arrived at the conclusion that the posterior region indicated the maximum rise, subsequently found from a larger number of observations that the order of regions, with regard to both degree and rapidity of rise of temperature in all four kinds of work specified, was (with some exceptions) 1st. Anterior region; 2nd middle region; 3rd posterior region.

Alimentary Canal.—At the Westminster Medical Society, Mr Quain related the following case, which strikingly illustrates the influence of involuntary Attention:—"A gentleman, who had constantly witnessed the sufferings of a friend afflicted with stricture of the œsophagus, had so great an impression made on his nervous system, that after some time he experienced a similar difficulty of swallowing, and ultimately died of the spasmodic impediment produced by merely thinking of another's pain" (xxxviii, p. 273).

The rejection of the contents of the stomach from a purely mental state is well exemplified in an experiment made upon 100 patients in a hospital, and reported by Dr Durand (de Gros) in his able work '*Essais de Physiologie Philosophique.*' The house-surgeon administered to them such inert draughts as sugared water; then, full of alarm, he pretended to have made a mistake in inadvertently giving them an emetic, instead of syrup of gum.

The result may easily be anticipated by those who can estimate the influence of the Imagination. *No fewer than 80—four-fifths—were unmistakably sick.* How many of the rest suffered from nausea is not stated. We need not approve of the pious fraud of the *infirmier*, but the experiment having been made, it is a pity so many people should have been rendered miserable without good use being made of their discomfort. In regard to misleading patients generally, even *causâ scientiæ*, one of the practical difficulties the investigation into the influence of the Imagination presents, is certainly the unseemliness of making experiments of this nature, and the danger of sullyng that strict honour which by no profession is more prized or maintained than by the professors of the medical art.

The often quoted experience of Van Swieten illustrates the influence of an idea, apart from Imagination or Expectation, in exciting an act which had originally been excited by an impression from without. He relates that he once passed a dead dog in a state of putrescence, and the stench caused him to vomit. Having occasion to pass the same place, *several years afterwards*, the circumstance was so vividly recalled, that he could not help vomiting. Clearer proof could not be found of the action of a mental image, or a subjective impression (a foreseeing, Unzer would say) upon the muscular system. Such a case might be, perhaps, more correctly given under the head of Sensation, for recollection of the circumstance most likely involved a resuscitation or revival of the former accompanying olfactory and nauseating sensations. In a medical point of view, associations are, from their

immense influence, of the greatest importance, in nervous affections especially; and are frequently the foundation and explanation of the bodily and mental phenomena little suspected by the physician, and concealed by the patient, who is ashamed to acknowledge the circumstance.

The most trivial matter attaches certain ideas to certain places, persons, and especially articles of dress, to which they cling with a tenacity which is truly surprising unless the influence of the association of ideas and the automatic action of the brain be considered. When the image called up is disagreeable, it will haunt the mind grievously, and may at last cause acts over which the Will has no longer any control, and which are those of a madman. Locke calls the association of ideas a disease of the understanding, and it may certainly prove as mischievous in inducing bodily and mental diseases as it is pernicious in the employment of the reasoning powers, and the search after moral truth.

Van Swieten says (xl, p. 414), "I have seen a man who had taken a sufficiently nauseating draught, not only shudder and be nauseated, but also be frequently purged, when he merely saw the cup in which he had taken the medicine; and adds, "*Sic sola idea fastidiosi remedii renovata purgantis pharmaci vices supplevit, et totum corpus turbavit.*" He compares this to our thinking of sadness or even feeling sad when we merely see the *word* sadness, although it has only an arbitrary connection with it.

The efficacy of an ideal purgative in exciting the peristaltic action of the intestines is well illustrated in the following cases. The latter of the two is the more

valuable from being the personal experience of a medical man.

The other day a lady nurse, at the Plymouth Hospital, told me of a patient in one of the female wards, who was much disconcerted at the doctor having left the hospital without ordering an aperient pill, as he had intended to do. The nurse procured a bread-pill, and satisfied her mind. Next day she found, on enquiry, that it had answered its purpose satisfactorily.

“Dr S—, all his life had the greatest horror of taking medicine, although fully admitting the beneficial and necessary effects of it, and constantly prescribing it judiciously for others ; he consequently never took it. After a certain period of life, however, he began to experience a torpidity of the bowels and all the consequent uneasiness, rendering it apparent to himself that relief could only be obtained by the means he prescribed to his patients ; namely, the taking of medicine. After due deliberation, accordingly, and conflict with himself, he decided upon taking some, and imagining that an ordinary dose of salts would answer all the purpose, and be less nauseous than most others, he carefully mixed one, and laid it by his bedside at night to be taken in the morning when he first woke. The proximity of it, however, and the impression on his mind of the horrible dose which awaited his first waking, banished sleep from his eyes, and kept it continually before him. At length, however, he did sleep, and even then the vision did not leave him, but like the haunting phantom of the roasting pig to the slumbering glutton, it assumed various guises and positions to his mind, the difference alone being that his

was more purely imaginary, as he had not swallowed the cause of the mental disturbance, which the other had, but suffered from the anticipation. At length, however, he awoke, and so far from requiring the prepared medicine found all occasion for it removed by an effort of nature, and from that time he declares that he has nothing to do when suffering from torpid bowels but to lay a dose by his bedside at night, and that it as effectually acts as if he had swallowed it" (xli, p. 64).

Crichton quotes from Pechlin the case of a student at Leyden, who, in want of a purgative, looked in the index of a medical work for the word "pill," which he supposed must be a purgative, and took one containing opium, hyoscyamus, and astringents, and was accordingly purged as he desired (lxiii, ii, p. 446).

CHAPTER V

INFLUENCE OF THE INTELLECT UPON THE ORGANIC
FUNCTIONS

THE Intellect may powerfully excite, modify, or suspend the Organic Functions, causing changes in nutrition, secretion, and excretion, and thereby affecting the development and maintenance of the body.

The consideration we have already given to the influence of Intellect, in its various aspects, upon the muscles engaged in the vascular and respiratory systems, has, at the same time, exhibited to a considerable extent its actions upon the functions of organic life. The part played by the involuntary muscles in the processes of secretion and nutrition is so important that the two cannot properly be separated, and the present is in fact a continuation and supplement of the previous chapter.

As mental activity affects the respiration, and the circulation and aërication of the blood, its influence on secretion and nutrition might be predicated even without proceeding more deeply into the causes of this influence. But the question which at once arises, whether these variations in the circulation of the blood in the organs and tissues adequately account for the alterations in

nutrition and secretion, now referred to, deserves consideration here.* Let us first notice the conclusion arrived at by Cl. Bernard. Admitting that the nervous system exercises an incontestable influence upon these processes extending to their chemical phenomena, he maintains (xciii) that all this can be accounted for by the action of the nervous system upon the circulation of blood, and that there is no occasion to have recourse to the direct influence of nerves upon nutrition and secretion. He refers to the starch transformed in a vegetable cell into sugar, due to the action of certain ferments, as also some special conditions of temperature; and points out that in animals we find the same conditions, the same ferments, with this difference only—in vegetable life the phenomenon is produced under the influence of the sap, germination, &c.; in animals, on the contrary, it is dominated by the nervous system (though that this is not essential, is seen in the embryo), “which acts directly upon the vessels, and the modifications thus produced in the vascular system react upon the chemical phenomena.” He believes that both sympathetic and cerebro-spinal motor nerves act upon the vessels: the former acting as moderators, contract them and lessen the supply of blood; the latter, on the contrary, when stimulated, cause the vessels actively to dilate. “Voilà tout le mécanisme de l’influence nerveuse.”

Bernard’s experiments on the sub-maxillary gland seemed to show that the whole process was explicable by what we know concerning vaso-motor action, but

* The remarks which follow apply equally to the mode of action of the Emotions upon the same processes.

later observations, notably those of Ludwig (Arbeiten an d. Physiolog. Lab. a. Leipzig), show that this expresses only one side of the question and that a second element exists, viz. the direct action of the facial nerve on the secreting corpuscles. This is completely illustrated by the crucial experiment of stimulating the facial nerves in the head of a decapitated animal, the result being increased secretion of saliva, the blood circulation being in this case of course out of consideration.

The action of the chemical phenomena is augmented whenever the nerves derived from the cerebro-spinal system antagonise or paralyse the influence of the sympathetic nerves, thus allowing of more blood and a high temperature; phenomena which may result from the suspended action of the sympathetic, or the increased action of the cerebro-spinal nerves. On the other hand, when the sympathetic is stimulated, and the calibre of the vessels is lessened, the chemical phenomena diminish. In the illustration he employs of the sub-maxillary gland, the antagonising action of the chorda tympani upon the sympathetic is supposed to cause an afflux of blood to the gland, the cells of which contain certain special chemical principles which this blood serves to dissolve, and so excites the function of the gland. Secretion is the peculiar characteristic of the glands, as contraction is of muscle; "the accumulation of a peculiar compound within its primitive cells is the exclusive privilege of the glandular tissue; a watery menstruum is then poured forth to dissolve this substance and convey it into the excretory ducts." A sufficient supply of blood is required to create the ferment or active principle of each secretion. Motion

is necessary for this, although a chemical process ; and for motion, muscle is indispensable. Thus, although the nervous system cannot create new histological elements, "it sets forth their characteristic properties ;" it can retard or accelerate the secretive process, and this is done by the muscular apparatus. "A new chemical compound is created through its action." On this hypothesis, therefore, the nerves do not directly interfere with organic chemical phenomena as galvanism acts upon inorganic matter, but only through the circulation. "The terminal ramifications of the nervous system do not float in the liquids of the economy," and therefore a distinct mechanism—the muscular apparatus of the vessels is required to enable these nervous fibres "to modify the composition of these fluids" (xlv, April 27th, 1861). But sufficient as the position taken by Bernard* was for the purpose of showing how varying mental states must influence the organic functions by acting upon the nerves (whether sympathetic or cerebro-spinal) which regulate the calibre of the vessels, it has failed to commend itself as the whole truth.

* In his '*Leçons de Pathologie Experimentale*,' 1872, Claude Bernard repeated his sentiments in the following among other passages:—"Dans les vaisseaux comme partout ailleurs, c'est toujours sur un élément contractile que se porterait l'action des nerfs : l'anatomie microscopique vient ici en aide à la physiologie pour démontrer dans les parois vasculaires l'existence évidente de ces mêmes éléments. Si dans les glandes et dans d'autres tissus cette démonstration n'est pas donnée, ce n'est pas un motif pour admettre les nerfs trophiques agissant d'une manière chimique directe, et dont on a invoqué l'existence pour expliquer les phénomènes sécréteurs" (lxviii, p. 311).

It has in fact been demonstrated and is not now disputed that nerves may act directly upon cells, pigmentary, secretory, and other, although it does not follow that there is a distinct set of trophic nerves. It is true as Prof. Rolleston observes in regard to the influence of defeat upon an army, in making it readily succumb to dysentery, scorbutus, and malaria, or of gaol life upon prisoners, there is no clear indication as to whether they are produced by vascular changes, or by the direct action of nerves which cause intracellular molecular disturbance, but other instances unquestionably show, as we have seen, that nerve force can act directly on tissues without the intervention of blood-vessels.

Lister's observations on the pigmentary cells in the web of a frog's foot have proved that change of colour is there "dependent upon molecular movements carried on in the interior of cells under the influence of the nervous, and under circumstances which exclude the intervention of the blood vascular system" (xlvi); and, as Professor Rolleston observes, "A force which can be seen to produce molecular movement within a pigment cell, may well be supposed to be competent to produce nutritional or chemical changes in the interior of cells of other characters" (xlvi, l. c.)

In regard to secretion, although vivisections seem to prove that it can be arrested or excited through vasomotor nerves, the peripheral termination of sympathetic nerves in glands, as traced by Pflüger and Kupffer suggests their direct action on the secretory process, as efferent nerves, although some maintain that these are afferent nerves, the influence of which, proceeding *a fronte*,

is reflected upon those which regulate the calibre of the vessels.

While, then, we can entertain no doubt as to the fact that mental states dilate and contract the small vessels which convey nutriment to the cells of glands and tissues, and that this alone would go far to account for the phenomena which result from Attention, the Imagination, and various forms of ideational activity, it is certain we repeat, that there is also an influence directly communicated from the mind to the organic cells, whether through sensory, motor, or distinct trophic nerves.

Illustrations of the influence of ideas upon Secretion—the representative states of consciousness which Imagination, both in its recollective and constructive or creative form, comprises—will readily occur to the reader. Unzer expresses the truth very clearly. "Many glands pour out their secretions from imaginations." The mental image or idea must, of course, be in relation to the secreting organ.

The salivary glands are so notably affected by ideas that they are frequently referred to. We know that the mere idea of food is sufficient to excite the function of these glands. To procure sufficient saliva for his experiments, Eberle vividly imagined acid fruits. If a teaspoonful of coloured water be placed in the mouth under the impression that it is tincture of pellitory, the amount of saliva will be considerably increased. In the hypnotic state this would be still more effective. Just as spasms or convulsions are more likely to happen when the will is suspended and the cord acts independently, so when

the controlling power is removed from the brain, its automatic action is intensified, and ideas exert much more power over the organic functions when directed towards them. There is a constant antagonism between voluntary and involuntary actions, and when anything occurs to neutralise the former, the latter rule the hour. One reason why the emotions act so much more powerfully upon these functions is, because they are less under the control of volition than the intellectual faculties are, besides being probably in much closer anatomical relation with the nervous centres which influence the vascularity of the secreting glands.

The influence of Attention on the mammary glands is well recognised. The case of a lady is recorded by Dr Parry, who, after the period of nursing, was accustomed to have milk secreted whenever she heard a child cry. Reflex action of the encephalic centres specially related to the organic functions is here well illustrated.

The secretion of gastric juice is increased by the idea of eating, as proved by experiments on men and dogs with gastric fistulæ.

As regards the secretion of the liver, we may refer here to what is called a "bilious" headache when brought on by overwork at the desk. Any one given to study can trace such an attack from its earliest stage. Dr Latham of Cambridge, in a "Clinical Lecture on Nervous or Sick-headaches," (xxxii, March 23rd, 1872), states that he meets with a great many cases (sufficiently severe to require treatment) both in males and females, but "perhaps in a University town, owing to the large proportion of individuals of studious and sedentary habits, it

may be more prevalent among males than in other places." The attacks he refers to were brought on by "prolonged mental work, protracted mental excitement, or any intense strain on the feelings." That the attack may come on during actual work, and be arrested by suspending mental application, we have ample evidence to prove. It is, however, true that, if there is actual mental excitement, "the attack may not be developed during the paroxysm, but afterwards, when the excitement has passed off, and the mental strain is somewhat lessened." He marks two stages, one of disordered sensation, including glimmering, spectral forms, and other signs of visual derangement, tingling in some portion of the body as the arm or one side of the tongue, affections of hearing and (involving the motor centres) speech, and loss of power over the facial muscles; the other of headache and nausea, which so often occur with the sensorial disturbances, the chief symptoms being cold feet, restlessness, and the localised, more or less piercing pain felt in the head, especially (so far as our observation goes) over the left eyebrow. Dr Latham's cases were generally marked by anæmia, a relaxed condition of the muscles and arteries; the pulse small and compressible, often slow, but accelerated on slight exertion; the general tone of the system, in short, being lowered. The headache he considers explained by the contraction of the cerebral vessels in the first instance, being followed by their dilatation; the vaso-motor nerves of the sympathetic being first excited, and then exhausted.

It must be understood, moreover, that it is not necessary to turn aside to the alimentary canal in order to explain

the phenomena (*i. e.* as arising from actual visceral derangement), since they can readily follow as consequences of cerebral exhaustion, and thus may be the subjective side of actual inco-ordinate disturbances occurring in the cortical perceptive centres.

Then again, Thought acts upon the secretory functions of the skin, kidneys, and the intestinal glands. Hence ideal diaphoretics, diuretics, and purgatives, exclusive of those which excite the peristaltic action of the intestines.

Crichton gives, on the authority of Pechlin, the case of a student who applied to him for advice for (*inter alia*) a troublesome collection of glairy mucus every morning. For this the doctor says, "I ordered him fifteen grains of white vitriol, with a little cream of tartar, in order to extricate the *pituita* from his stomach. He followed my advice, but by a preposterous conceit persuaded himself that the powder was intended as a sweat; and accordingly after he had swallowed it, he covered himself all over with the bed-clothes and fell into a profuse perspiration. He then came to thank me and tell me that the powder had been attended with the desired success. I no sooner heard of a sweat than, full of wonder, I asked him if he had taken any other remedy than the one I ordered him. He assured me he had not, but that he thought the powder which I prescribed for him was to sweat him; which effect he therefore expected, and which had been effectually accomplished" (lxiii, II, 445). The above case would have been still more satisfactory as an instance of the influence of expectation, or, as it may perhaps be termed, expectant imagination, had the patient not covered himself all over with bed-clothes.

The influence of intense study, long continued, in causing diabetes will not be questioned. In one of the most rapid cases which have fallen under our notice, this was apparently the cause. Dr Richardson refers to three cases "in which the first excretion of sugar and the profuse diuresis were sequential to severe mental strain," and observes that "they constitute a hopeless class; the danger sudden, the course rapid, the fatal end sure" (xxi, 1868).

In the 'Medical Times and Gazette,' Oct. 10th, 1868, are given the results of an examination by Dr Byasson of the renal secretion passed under the opposite conditions of repose and cerebral activity. They may be thus summarised :

1st. The exercise of Thought was followed by an increase in the amount of urine. The number 1157 represented the quantity in cubic centimètres on the days of repose; 1320 on those of cerebral activity.

2nd. The amount of urea was augmented in a marked manner (indicating increased disintegration), there being about a drachm more on the day of cerebral work than on that of repose. Dr Byasson does not doubt the contrast would be greater if complete repose had been secured. "The experiments were so arranged that a day devoted to brain-work sometimes succeeded a day of repose and sometimes a day of muscular work, and in each case there was a perfect concordance in the results."

3rd. A slight but uniform increase in the amount of the phosphates and sulphates during mental activity. Anhydrous phosphoric acid is represented on the day of repose by 1.51, and on the day of active thought by 1.98.

4th. The density, the acidity, the uric acid, lime, magnesia and potash, were scarcely affected. Chlorine was less in amount.

Dr Byasson says that he can tell by a single analysis of the urine whether a man has passed the day in repose, or active thought, or muscular action, supposing the diet to have been uniform and the external conditions similar during three days so employed.

Changes in the chemical composition of other secretions are much more frequent in emotional than purely ideational states. Still, as Liebig says, "every conception, every mental affection is followed by changes in the chemical nature of the secreted fluids ; and every thought, every sensation, is accompanied by a change in the composition of the substance of the brain," which may lead to changes, however slight and transient, in the functional activity of glands.

Passing on to Nutrition, a few observations may be made upon the unquestionable influence excited by intellectual states. If nutrition only occurs when the vital force is more powerful than the opposing chemical forces, whatever in mental action lowers vitality will proportionately interfere with nutritive processes.

Intense mental application may be said to interfere with nutrition in one form or other. In determining, however, the general ill-effect of study upon the body, it is impossible accurately to disentangle its influence from that of loss of exercise, fresh air, &c. But that it interferes with nutrition in many instances cannot be doubted ; sufficiently so to justify the oft-quoted line from Shakespeare respecting Cassius's lean and hungry look, "He

thinks too much." Still it is rather the plotting thought—the studying the overthrow of inconvenient rivals—that is here referred to, which wears away the flesh, and which justifies the expression that "such men are dangerous." On the other hand, the removal of the means of study when the intellectual pursuits have become a habit, is detrimental to health. It is said of Petrarch that "his friend the Bishop of Cavaillon, fearing lest his too close devotion to study should wholly ruin his health, which was already much impaired, having procured of him the key of his library, immediately locked up his books and writing desks, saying to him, "I interdict you from pen, ink, paper, and books, for the space of ten days." Petrarch, though much pained in his feelings, nevertheless submitted to the mandate. The first day was passed by him in the most tedious manner; during the second he suffered under a constant headache, and on the third he became affected with fever. The bishop now taking pity on his condition, returned him his key, and thus restored him to his previous health" (xliii, p. 4).

Descuret devotes a chapter to the "Mania of Study," and cites Rousseau's exaggerated expression "The man who thinks is a depraved animal," which he paraphrases "The man who thinks too much depraves his constitution," and enumerates among the consequences of extreme mental exertion, gastritis, enteritis, hæmorrhoids, cancer of the stomach or intestines, and chronic affections of the urinary organs—a still greater exaggeration.

Whatever may be the injurious influence of mental work, the age to which many eminent thinkers have attained shows, at least, that it is not inconsistent with

longevity, although from disuse the muscular system may become wasted. We have collected from several sources the following ages, at death, of men who have exercised their intellectual powers beyond the average :

Aristotle lived to 63 ; Archimedes, 75 ; Bacon, 66 ; Boerhave, 70 ; Blumenbach, 88 ; Brougham, 90 ; Bossuet, 77 ; Sir Edward Coke, 84 ; Carnéades ("so intemperate in his thirst after knowledge that he did not even give himself time to comb his head or pare his nails"), 90 ; Chaucer, 71 ; Adam Clarke, 70 ; Democritus, 109 ; Dryden, 69 ; Miss Edgeworth, 82 ; Euler, 76 ; Euripides, 75 ; Fontanelle, 100 ; Franklin, 84 ; Dr Fothergill, 68 ; Galileo, 78 ; Galen, 90 ; Gauss, 78 ; Handel, 65 ; Caroline Herschell, 98 ; Hippocrates, 99 ; Hume, 66 ; W. Hunter, 65 ; J. Hunter, 65 ; Dr Johnson, 75 ; Kant, 80 ; Landor, 89 ; Leibnitz, 70 ; Locke, 73 ; Lagrange, 77 ; Laplace, 78 ; Milton, 66 ; Newton, 85 ; Dr Olbers, 80 ; Pindar, 80 ; Plato, 80 ; Pythagoras, 90 ; Quintilian, 80 ; Reid, 87 ; Dugald Stewart, 75 ; Solon, 80 ; Sophocles, 90 ; Simonides, 89 ; Mrs Somerville, 92 ; Thucydides, 80 ; Thales, 96 ; Wordsworth, 80 ; Xenophon, 90 ; Zeno, 98 ; Zimmermann, 67.

In some of the foregoing examples it must be remembered that, though life was prolonged, the organ of mind itself was completely worn out.

" With curious art, the brain, too finely wrought,
Preys on itself, and is destroyed by thought."

Madden, in his ' Infirmities of Genius ' (quoted by Dr Sweetser), has endeavoured to estimate the relative longevity of different classes of authors. The natural

philosophers in his table are at the top, their age averaging 75. The poets are at the bottom, who average 57. Caspar gives the average age of clergymen at 65 ; merchants, 62 ; clerks, farmers, 61 each ; military men, 59 ; lawyers, 58 ; artists, 57 ; medical men, 56. It is obvious that the element of which we are in search is only one of many in these various occupations. It might be expected that, as appears above, medical men would be shorter lived than clergymen, without reference to mere brain work ; taking the deaths, however, of twenty-two distinguished members of the former profession in England in 1870, their ages ranged between 75 and 76. As to the natural philosophers (mainly mathematicians) and poets, whether or not statistics comprise a sufficient number of cases, it is highly probable that the greater longevity of the former is a fact. If Wordsworth is a marked exception he is also exceptional in the character of his poetry. He was more philosophical than emotional. Everything goes to prove that purely intellectual pursuits influence the organic functions much less powerfully than pursuits involving the passions. It shows the necessity of distinguishing between different forms of mental manifestation, the much closer connection which some mental processes have with the bodily organs than others ; the far greater tendency some have to interrupt and suspend their operation than others. Thus, it is obvious that Sir Isaac Newton's intense concentration of thought did not imperil the action of the heart, while John Hunter's intense indignation suspended its action. All forms of disease are indiscriminately laid at the door of study by Tissot, namely, gout, tumours, aneurisms,

inflammations, scirrhusities, ulcers, dropsies, baldness, apoplexies, convulsions, &c. ; but it would be altogether opposed to medical experience to assert that the chances of inflammation or aneurism, and apoplexy or convulsions arising from study are equal. An aortic aneurism or a dropsy is much more likely to result from passion or other sudden emotional action than from thought.

Under this division reference should be made to the influence which we cannot doubt that mental states may, under favorable circumstances, exercise upon absorption. Professor Laycock has maintained "the possibility of a lymph deposit being absorbed from an opaque cornea by the daily direction of the Attention to the part for a prolonged period by means of mesmeric passes" (vii, Oct., 1851). If this be so, we have a fact, the principle contained in which forms a most important basis for the practical treatment of some diseases. It is in entire accordance with the physiological law laid down by Müller : "An idea that a structural defect will certainly be removed by a certain act increases the organic action of the part" (iii, p. 1396). The application of this law—one which we desire to bring out here in bold relief—belongs, however, to the Chapter on the treatment of disease by psychical agents.

In concluding the consideration of the Influence of the Intellect upon the Body, it is important to have clearly in view, that :—

1. Intellectual States, the result of impressions made upon the senses from without, or consisting of purely ideal states, whether these be formed by recollective or creative Imagination (the simple remembrance of sensa-

tions excited by the outer world, or so combined as to construct new forms), cause Sensation, Motion, and important changes in the Organic Functions of the body.

2. These ideal states may be as vivid and operative as if actually induced by real objects acting directly upon the sensory nerves.

3. In the ideal states, the bodily changes correspond to the ideas present in the mind, and are themselves involuntary; illustrating the automatic action of the hemispheres upon the lower sensory, motor, and sympathetic centres.

4. The Muscular movements which express mental states (gesture language), correspond in great measure to those movements which arise from impressions from external stimuli on the peripheral expansion of sensory nerves. They are figurative, and hence verbal expressions also are applied in common to both; in the one case intended to be literal, in the other metaphoric. This analogous language, thus applied to ideal and actual states, may either be explained on the principle that the encephalic seats of both are identical, or that ideational changes always tend to pass downwards to the motor and sensory centres.

In fact the muscular movements which form the elements in the language of gesture are repetitions of former processes which have been evoked by external stimuli, such stimuli being of sufficient force to determine a purposive muscular action. In the case where a gesture is made, we believe that the overflow of energy passes from the cortical idealising centres down along the lines of

least resistance, *i.e.* those which are stereotyped by former action.

5. In either mental state—the ideal and that excited by sensible objects—the Sensorium may be placed in exactly the same condition both as to kind and degree of change, the stimulus proceeding from within in the one case, and from without in the other ; the mind in the former instance always referring the sensation to the peripheral end of the nerves.

PART II

THE EMOTIONS

CHAPTER VI

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES

I WISH to say a few words in regard to the sense in which the term Emotion is here employed, though my object throughout these observations is to present *Illustrations* of the action of Mind upon Body, rather than to enter into the metaphysical questions which might be considered in connection therewith.

Every one is conscious of a difference between a purely intellectual operation of the mind and that state of feeling or sentiment which, also internal and mental, is equally removed from (though generally involving) a bodily sensation, whether of pleasure or pain ; and which, from its occasioning suffering, is often termed Passion ; which likewise, because it moves our being to its very depths, now with delight, now with anguish, is expressively called Emotion—a true commotion of the mind, involving in

its effects the body also;* thus subjectively rendering us conscious of the tumultuous mental movements which have arisen, and objectively manifesting to the outer world the signs of the disturbance within; the climax being the "*mens emota*," or crazy distraction, of Latin writers. We can, then, easily recognise a condition which differs from any of those states of consciousness which, in reference to their influence on the bodily organs and tissues, we have been considering; differing also from the Will; and yet, as an idea may instantly excite emotion, and *vice versâ*; and as the emotions form motives which are rapidly followed by acts of Will, ideational, emotional, and volitional states are intimately bound together.

We sometimes apply the word Emotion to the simple (however special) state of mental pleasure or pain; at others to a compound state, which includes the idea in immediate relation with it. Thus a painful mental feeling may exist, and, until we know to what it refers, we can only term it an emotional state; but if we find it arises out of the apprehension of evil, we call it Fear, a specific emotion. We cannot, therefore, in considering

* Hence the not infrequent practice of speaking of *mental* emotion to distinguish it from bodily commotion. Indeed, a writer on the Passions (Dr. Cogan) goes so far as to say "Emotions are principally and primitively applicable to the sensible changes and visible effects which particular passions produce *upon the frame* in consequence of a particular agitation of mind." It is never employed in this sense in the present work, in which Emotion is regarded as the state which causes these effects, and therefore as mental. It is very certain, however, that our notion of what constitutes an emotion is largely derived from its physical accompaniments.

the specific emotions, and passing beyond mere pleasure and pain of mind, get rid, if we would, of an ideational element; one which determines the character and direction of the purely emotional feeling which it generates. The term Emotion will be used both in its simple and compound signification, though it may occasionally be convenient to designate the former as Emotion *proper*. While, therefore, endeavouring to distinguish, so far as is practically useful, emotional and intellectual states of mind, they will be inevitably blended together, and under the head of Emotions, employed in a broad sense, we shall treat of those compound states* which, strictly speaking include an ideational or intellectual, as well as an affective or emotional element.

“As every emotion involves the presentation or representation of objects and actions; and as the perceptions and, by implication, the recollections of objects and actions all imply cognitions, it follows that no emotion can be *absolutely* free from cognition.” (x, 1, p. 475).

When our desires are gratified, there results mental pleasure—Joy. When, on the contrary, they are disappointed, there arises mental pain—Grief or Sorrow. Such are emotions as regards their quality, but they vary also in their quantitative character. Again, they may be manifested in very different degrees of intensity and force

* The word Passion might be used to include the idea of a certain attainable gratification, and the emotion or feeling which is associated with it, while the word Emotion might be always rigidly restricted to the latter state; but as custom has rendered the passions and emotions synonymous, we shall probably avoid confusion by pursuing the course indicated in the text.

from the slight ripple to the resistless wave : and lastly, they may differ in their persistence. It is obvious that, as these characters vary, the influence of the emotion, upon the body will be modified.

States of consciousness involving Emotion may be variously classified, but all classifications are more or less arbitrary, and we shall not pretend to give one which is either complete or reduces them to their simplest form ; but the following grouping of the feelings will be found useful for our present purpose. Indefinite they must necessarily be. As Spencer says, " a thought, no matter how simple or how complex, contains more or less definable and nameable elements, having connections that may be described with distinctness. But a sentiment is altogether vague in its outlines, and has a structure which continues indistinct even under the most patient introspection " (x, ii. p. 4). Those in the first division are antagonistic to those in the second ; and, on the whole, the former involve pleasurable or elevating, and the latter painful or depressing, Emotion.

I

1. **Joy**, and its various forms or synonyms, Contentment, Cheerfulness, Mirthfulness, and the intense states of Rapture and Ecstasy.

2. **Hope**, which has been referred to in connection with the Imagination under-

II

1. **Grief or Sorrow**, is, in its various stages and degrees, synonymous with Sadness, Affliction, Distress, Discontent, Melancholy.

2. **Despair**, the antithesis of Hope and Faith.

stood in its broad medical sense, expects—has *faith*—that a pleasurable event will happen, and is the opposite of Despair.

3. **Self-esteem**, Egoism, Self-complacency, Self-reliance, culminating in Pride or Conceit, and Vanity, is a selfish feeling, opposed to Modesty, Humility, and Cringing; assumes when allied with hatred of another, the form of Scorn, Contempt, Disdain, and Impudence.

4. **Courage**, Self-possession, or Confidence, implies energy; is the opposite of Fear and Cowardice.

3. **Humility**, Modesty, Self-abasement, Remorse; the lowest and ignoble form—Cringing.

4. **Fear**, and its acute or sudden form of Fright, and intenser form of Terror or Horror, with the minor ones of Faintheartedness, Anxiety and Care, though the last may be regarded as gaining in chronicity what it loses in intensity. When epidemic, Fear assumes the Panic form. Allied to Suspicion.

Wonder and Astonishment or Surprise when

painful, may be classed with Fear.

5. **Calmness**, the opposite of Anger. Self-control implies that there is an emotion to repress.

5. **Anger** and its aggravated phases of Rage, Fury, Wrath, or what is commonly understood as Passion.

6. **Love** includes the love of the true, the beautiful, and the good, but is mainly applicable to the affection between human beings, in their various relations of mother and child, husband and wife, &c.

6. **Hate**, the ignoble and more chronic form of Anger, leading to Revenge; the antithesis of Love.

Admiration of another more than of self is the foundation of Veneration, Adoration, or Reverence.

Wonder or Astonishment, when pleasurable, is a form of Admiration.

7. **Benevolence** or Generosity is a form of Sympathy, Compassion, or Pity—a mixture of Love and Sadness. Involves “the endeavour to free that which we pity from suffering” (Spinoza). “Pity is akin

7. **Malevolence**, Misanthropy, Avariciousness; the direct opposite of Benevolence or Generosity.

to Love." This is a mixed state which excites painful as well as pleasurable feeling.

Of emotional states referred to in the succeeding illustrations, the most important will be those which arise in connection with GRIEF, DESPAIR, FEAR or FRIGHT, ANGER or RAGE; JOY, HOPE, PRIDE and CONFIDENCE. Obviously some of the mental states enumerated in the foregoing classification are felt to be less emotional in their character than others; yet they can hardly operate without involving feeling of a certain kind, and they fall under the designation of Emotions understood in the broad and complex signification. They are Passions, in one of the many senses attached to the word; and although it is true they do not so markedly affect the body as anger, &c., they have, at any rate, outward physical signs which cannot be overlooked. When Bichat spoke of the Passions, he evidently had in view such emotions as anger and joy, which so remarkably influence the organic functions. His editor, M. Cerise, who places the strictly emotional element of the sentiments or passions in the sympathetic, and the ideal element in the brain, complains of Bichat's confusion of terms, and of his location of the whole instead of a part, of the passions in the visceral or ganglionic system. "All that Bichat says of the seat of the passions, ought to be restricted to the emotions" (li).

These remarks on the definition of Emotion have insensibly led us into the anatomical and physiological

questions which arise in connection with it ; and without entering minutely into their consideration, we shall here pursue the subject a little further. Cerise as we have said, believes that Emotion proper has its seat in organic life, while the desires, or sentiments, with which such emotion is associated belong to the brain. According to his views the solar plexus is the focus where, under the form of sentimental emotions, the various general conditions of the organism designated "thoughts" on the one part, and the impressions and effective ideas on the other, are really felt, or where, so to speak, their echo is heard. He does not pretend that it is easy to circumscribe it anatomically, since it is not composed of a special apparatus, but rather an indefinite one ; so that the emotional echo which there takes place does not offer any very distinct character, if the *idea* of the cause or of the object of the emotion does not convey to it the precision which it lacks. He remarks that, although in most men the epigastric emotion is very obscure, it is sufficient to prove to us that it occurs in a ganglionic focus communicating with one or more sensory or motor nerves—an intermediate *appareil* between the general conditions of the organism and the brain ; between, in other words, organic and animal life. All these conditions are, he considers, completely met by the *Solar plexus* of the sympathetic (li, pp. 306—7).

Whether we employ the term Emotion, however, in a broad or narrow sense, we must entirely decline to locate it in the sympathetic, and can only regard the sensation experienced at the epigastrium as one of the many *results* of emotional excitement, hereafter to be considered.

Dismissing, then, as wholly untenable the theory which would find a seat for the emotions in any of the sympathetic ganglia, or, in short, in any other region of the body than the encephalon,* let us consider to what portion of it they may probably be referred.

It is striking to observe how many cerebral physiologists have arrived at the conclusion that the emotions are connected in some special way with the medulla oblongata, or the adjoining encephalic ganglia; or employing the term *Sensorium* or *sensorium commune* in the old sense of Unzer who included in it—besides the medulla spinalis—the medulla oblongata, the optic thalami, and pons Varolii, it may be said that to this region of the cerebro-spinal axis they have agreed in assigning a more direct connection with the emotions than to any other part of the nervous system. Thus Willis referred their seat to the pons Varolii; and Dr Todd to “the posterior and superior part of the meso-cephale” in the following passages (c, p. 283): “Emotions are, for the most part excited through the senses. . . . But emotions may likewise be produced by intellectual change. . . . Now, emotion may give rise to movements independent of the Will. The extraordinary influence of emotion on the countenance is well known, and this may affect one side of the face, which is paralysed to the influence of the Will, or it may excite movements of the limbs, even when the Will can exert no control over them. From these facts it is plain that that part of the brain which is

* The term *Encephalon* is always employed, in this work, in its comprehensive sense of the contents of the skull; the term *Cerebrum* is restricted to the hemispheres.

influenced by Emotion, must be so connected that the convolutions may affect it or be affected by it ; that it may be readily acted on by the nerves of pure sense ; that it may influence the spinal cord and the motor nerves of the face when the ordinary channels of voluntary action have been stopped. No part possesses these conditions so completely as the superior and posterior part of the meso-cephale, which we have already noticed as concerned in acts of sensation. Is an emotion excited by an impression made upon one of the senses ? This part becomes directly affected, and through the optic thalamus, the emotional feeling causes intellectual change. The working of the intellect on the other hand, may act on the seat of emotion through the same channel ; and an excitement of this part produce movement of a limb, or of all the limbs, by its influence on the spinal cord through the olivary columns."

Brown-Séquard (1860, lviii, p. 226), referring to Dr Todd's views, observes that he has given some good reasons in their support, adding, "I am ready to admit that the pons Varolii, particularly by its part connected with the roots of the auditive nerve, is a portion of the centre of emotional movements, but not the seat of the whole of this centre. The medulla oblongata, I think, is also a part of this centre."

Dr Carpenter, writing in the October number of the '*Brit. and For. Med. Rev.*,' 1846, observed that "the occurrence of ideas in the cerebrum may produce feelings of pleasure or pain in the sensory ganglia analogous to those which are produced by sensations ; that the tendency to the recurrence of a certain class of ideas constantly

connected with feelings of pleasure or pain constitutes what is known as emotion, desire, or propensity; and that this is composite in its nature, involving the cerebrum for the formation of the ideas, and the sensory ganglia for the feelings with which they are associated." Essentially the same views are expressed in his 'Human Physiology,' 4th edit., 1853, and the author has ascertained that he continues to hold them, although he observes (in a letter dated Feb. 29th, 1872) that "it is impossible to give any *definite* reasons why the thalami should be regarded as the special seat of the Emotions. We do not *know*, in the first place, that they are the seat of common sensation; but the evidence of Comparative Anatomy seems to me unmistakably to point to the distinctness between the Sensorial Tract and the Cerebrum; and the phenomena of Unconscious Cerebration indicate that cerebral changes are only brought to consciousness through their acting on the sensorium commune, through the "nerves of the internal senses." Now, the Sensorial Tract, or some part of it, would seem to be the seat of the emotive or affective states, which immediately link themselves on either to sensations or to ideas; the impressions that produce the former coming by the sensory nerves, the latter by the nerves of the internal senses. For they are often so closely connected with the sensorial state that it is difficult to separate the two. Further, it seems clear that the emotions of the lower animals bear no proportion to the development of the cerebrum."

Dr Noble of Manchester, in an able and suggestive book published in 1858 (lxv), enunciated views to which attention has recently (1883) been directed by Prof.

Cleland of Glasgow. When, according to Dr Noble, the seat of emotional sensibility is acted upon from below by the nerves proceeding from the viscera and other parts of the body, there arise the buoyant or depressed feelings comprised under what is sometimes called the sixth sense of the Germans, *cænæsthesis*; when acted upon from above, Emotion; or to express these relations in Dr Noble's own words communicated to the writer, "I regard emotional sensibility as a form of internal feeling, distinct from sensation proper, and also from thought, and the memory of thought. I look upon the corpora striata and optic thalami, intermediate between the convolutions and the ganglia of external sensation, as the site of this inner sensibility; when active spontaneously, it forms the *cænæsthesis*, 'the spirits;' when active under provocation from sensation, it is *propensity*; when active from thought, *Emotion*, sentiment, and so on." On this hypothesis as to the seat of emotional feeling, Mr Morell has written, "It would harmonise extremely well with the whole observed development of our knowledge, which, commencing with a physical impulse, appears next in the form of an incipient mental sensibility, and then expands into distinct notions or ideas, which ideas can then, in their turn, react upon the emotions. The position of the above-mentioned ganglia at the base of the hemispheres corresponds exactly with the supposed function" (op. cit., p. 129).

Professor Laycock, who located in the cerebral hemispheres the egotistic instincts and propensities, the sexual and domestic instincts and moral sentiments, and looked upon the cerebellum as the centre of vegetative life and

of all the processes of the organic appetites and instincts, regarded the medulla oblongata "as at least the seat of the corporeal feeling of pleasure or pain." He thought it probable "that a series of changes takes place in the great encephalic centres, which end finally in the *medulla oblongata* before the higher feelings and sentiments can be experienced;" adapted movements, however, resulting from changes therein which are wholly independent of sensation or consciousness. "Being the seat of the substrata of all those corporeal actions—cries and facial movements, by which states of consciousness are manifested—these can be and are manifested automatically." After observing that those who are accustomed to associate consciousness with all adapted movements, cannot easily comprehend the automatic nature of the violent twitches of the face in infantile convulsions and the automatic groaning often uttered during sleep, as if expressive of great pain, from the action of a morbid condition of blood or lung on the afferent nerves of the pneumogastric, and through it on the *medulla oblongata*, he adds, "there are phenomena, however, in favour of the doctrine that *the medulla oblongata is the common sensory of all conscious states—whether they refer to corporeal processes or the purely encephalic changes associated with ideas*. The cerebral and cerebellar hemispheres may be considered as extensive peripheries, having, like the corporeal periphery, the *medulla oblongata* for their centre. So that teleorganic changes taking place therein, which, in the usual states, coincide with conscious states, as ideas, feelings, or desires, may, during morbid states, pass downwards to the medulla oblongata, and there excite

the activity of appropriate motor or kinetic substrata, without at the same time exciting any state of consciousness whatever. This is, in fact, what occurs in all cases of automatic or unconscious cerebral action. Possibly, it is in the *locus niger* we must look for this common sensory"* (lv, ii, pp. 443, 461).

Dr Kirkes, in his Handbook (1863), says, "it is not improbable that the sensory ganglia are the organs of those emotions and emotional acts or expressions which belong to the instincts which men and animals have in common—such as fear, anger, &c.—while through the hemispheres the mind manifests itself in its higher and peculiarly human emotions and feelings" (liii, pp. 469–70).

In his 'Principles of Psychology' (x, p. 572), Mr H. Spencer observes that "the medulla, being the seat of all feelings, whether aroused from without or from within, it naturally happens that its undue excitement, in whatever way caused, produces through the vagus nerves like effects on the viscera—it naturally happens that sensations intensely painful or pleasurable, and emotions intensely painful or pleasurable, alike cause fainting." (He adds that syncope may be caused even by intense intellectual action.) The reader acquainted with the writings of this psychologist, needs not to be informed that he believes in the constant co-operation of all the leading nervous centres in every thought and emotion. Still, as respects the

* "The vivisections of Brown-Séquard and Szokalski show that cries may be excited, independently of pain, by the reflex action of the *medulla oblongata*. They do not differ in their seat and origin from laughter," &c. (loc. cit.).

medulla oblongata, he regards it "as the seat of emotional feeling considered as a mental state apart from the movements to which it gives rise. Not, of course, that it *by itself* can generate Emotion, but that it is that out of which Emotion is evolved by the co-ordinating actions of the great centres above it. Sensations being the ultimate elements; ideas of them being but the partial excitations of the structures in which the sensations originally arose, and emotions being compounded out of the ideas of sensations (the composition being now mainly organic); it results that the centre in which all simple feelings or sensations are brought into relation, remains to the last that in which they are localised, to whatever extent they are recombined by the actions of higher structures." (Extract from a letter to the author, March 2nd, 1872.)

I confess to rather a strong leaning to any physiology of the Emotions which recognises a special and intimate *relationship* between them and the medulla oblongata, or some portion of the sensory ganglia, one in accordance with the observation of Brown-Séquard, that while the various nervous centres which compose the base of the brain are the *conductors* of *voluntary* motor influence, they are the *centres* of *emotional* movements (xlvi, August 17th 1861). The importance of the medulla oblongata in this connection is borne out by the observations of Dr Lockhart Clarke, who regards it as probable that the power of expressing emotions and desires is dependent upon the co-ordinating functions of the olivary bodies. ('On the Intimate Structure of the Brain,' lvi, 1868, p. 318). Schroeder van der Kolk held the same opinion, and went further. He found that in beasts of prey these

bodies are more highly developed than in herbivorous animals; the passions, especially anger, being accordingly much more strongly expressed in the faces of the carnivora than the herbivora. "The superior corpora olivaria appear to be organs for the involuntary or reflex expressions of the passions. . . . In birds they seem to serve for the movements of the feathers in the head and neck in passion" ('On the Med. Ob.,' lvii, p. 204). There is a wide distinction, however (though not necessarily a contradiction), between the above proposition of Lockhart Clarke, and holding that the medulla is the seat or organ of the emotions, in the sense in which Marshall Hall employs the term when he says, "Emotion, the passions, and the sense of pain have their seat in the medulla oblongata, and act not along the cerebral, but the true spinal and ganglionic nerves" (xvii, p. 22). There may be the close relationship between the emotions and the medulla, which the muscular co-ordination referred to by Dr Clarke implies, and yet the seat of Emotion be elsewhere; in the optic thalami,* as sug-

* The probability of these bodies being the seat of either common or emotional sensation is lessened if the opinion of Dr Clarke be correct that they are parts of the central apparatus concerned in vision. He has shown, in the 'Proceedings of the Royal Society' (vol. xi, 1861, p. 364), that the optic tracts or nerves are not only connected with the corpora quadrigemina, but a considerable division enters the optic thalamus, and spreads out amongst its cells. As remarked by Dr Clarke in a letter to the author, it is certain that we have frequent hæmorrhage and other morbid changes in these bodies without loss of Sensation, or any alteration in the state of the Emotions; and further, that although their size is in the direct ratio of that of the cerebral hemispheres, they are not so much

gested by Dr Carpenter, or the meso-cephale, as held by Dr Todd, or in the cerebral hemispheres themselves, as, in fact, Dr Clarke himself believes. Schroeder van der Kolk also regarded the hemispheres (posterior and middle lobes) as the seat of the emotions, and Dr Maudsley observes, "The hemispherical cells are confessedly not sensitive to *pain*; still they have a sensibility of their own to ideas, and the sensibility which thus declares the manner of their affection, is what we call emotional; and as there may be a hyperæsthesia or an anæsthesia of sense, so, also, there may be a hyperæsthesia or an anæsthesia of ideas. Certainly there do not appear to be satisfactory grounds, either in psychology or physiology, for supposing the nervous centres of emotion to be distinct from those of idea." "Emotion is strictly, perhaps, the sensibility of the supreme centres [hemispherical ganglia] to ideas" (lxiv, pp. 47, 137).

There is no doubt a source of error in the very simplicity of the exclusive view of the medulla oblongata being the seat of Emotion, since the whole nerve process which culminates in an emotional display varies so much in extent in one case, the disturbance affecting a simple reflex cycle in the medulla, and in others being evident as the result of a complicated action of the highest as well as the lowest centres. The hemispheres must be involved in any true and conscious emotion—in fact an unconscious emotion is a contradiction in terms. Thus the emotion may in one case be an example of the purest reflex action (*e.g.* a sudden start), or in another may pre-smaller in the ox and sheep than in man as one would expect on the supposition of their being the emotional centres.

sent a gradual development in the higher centres, culminating in a discharge from the lower. Such an instance would be found in the case where an individual experiences either of the emotions after having listened to a speaker for some time, and reasoned on what he heard.

Although, however, it must be admitted that there are objections to the attempt to dis sever and separately localise the intellectual and the emotional elements of mental states in which they are combined, I cannot but think such a special relationship between the emotional element and the medulla must be admitted as shall explain why the passions act upon the muscles and upon the organic functions, in a way universally felt to be different from that in which a purely intellectual process acts upon them. On the hypothesis which refers the intellectual and emotional elements equally to the hemispheres, or which does not at least recognise that the power of expressing emotions is dependent upon the medulla oblongata, it seems to me more difficult to account physiologically for the popular belief of the feelings being located in the heart or breast, and for the sensations at the pit of the stomach ; while the recognition, in some form or other, of an anatomical or physiological connection between the medulla oblongata and the emotions, brings the latter into close relation with the ganglionic cells of the pneumogastric, and with the alleged origin of the sympathetic or with its ganglionic centres.

With some difference of view, therefore, mainly on points of detail, there is a marked concurrence of opinion among modern physiologists as to the encephalic centre

of emotional changes; those, at least, which involve movements; all referring it to one or other of the encephalic divisions of the old *sensorium commune*. We feel justified, then, in assuming that this region bears a special relation to the emotions.

CHAPTER VII

INFLUENCE OF THE EMOTIONS UPON SENSATION

SECTION I.—Æsthesia

AN Emotion may excite ordinary Sensations (æsthesia), which, in addition, may be either excessive (hyperæsthesia), or diminished (anæsthesia), while it may also induce perverted sensations (paræsthesia), which when painful constitute dysæsthesia.

Passing, now, from the consideration of the general psychology and physiology of the Emotions, we proceed in the first place to examine the interesting series of phenomena resulting from the operation of their influence upon sensation. Ever tending to be confounded with the converse succession of events, the influence of morbid states of sensibility in producing emotional disorder, its consideration requires more discrimination than that of movements. We can scarcely avoid employing language which is not strictly scientific, and can be only understood in a popular sense. Indeed, with two elements so closely allied as the emotional and sensational—mental feeling and bodily feeling—it must constantly happen that in our terms, as in reality, we confound the two together, and in this blending fail to discover which is cause and which is effect, or speak of the consciousness of corporeal

pleasure and pain as if it were not itself in one sense a mental state, although only referring to the condition of the body. We justly speak of some feelings as corporeal and of others as mental, although the former state involves consciousness as well as the latter; only it has reference to the condition of something external to mind, which impresses the extremities of the sensory nerves distributed upon and in the body. So with the special senses, while consciousness is implied, it has reference to the varying state of the bodily organs, the eye, the ear &c., as impressed by external objects. It is, however, perfectly easy, in spite of metaphysical difficulties of this kind, to make clear what is meant by the influence of a powerful emotion upon sensation, as a part of that influence of the mind upon the body which we are endeavouring, in this work, to point out and illustrate. For example, there can be no question as to the fact that moral disgust does in some instances cause the sensation of nausea, or that distress of mind may occasion neuralgia, or fright the sensation of cold, or that the senses may, under fear, be stimulated centrally, so as to cause subjective sensations, whether olfactory, visual, auditory, gustatory or tactile. These facts remain of interest and importance, although the bare statement of them suggests some questions of difficulty. They are so, whether our physiology regards the functions of the hemispherical ganglia as comprising the sensational as well as the ideational elements of the passions—(see *ante*, p. 174)—or whether it relegates the former to the sensory ganglia. They are so, although not only do mental and physical sensations merge imperceptibly into each other—for we constantly witness the same results

from emotional as from sensational excitement. physical and corporeal pain alike acting upon the body (as, *e.g.*, in quickening the circulation)—but mental sensations are so united with their associated ideas that it is difficult, and often impossible, to separate the purely emotional from the ideational elements of passion. It is a penalty which we pay for our classifications and divisions that, however, convenient they are up to a certain point, they sometimes lead us to do violence to nature ; to dis sever that which is inseparable, to sacrifice in the present case, it may be, the intimate cohesion of psychical states to the idol of reducing everything in science to orders and classes.

When we start with Emotion, in its bald sense, as our first element in the series of phenomena under review, we lose sight for the time of the mental conception which has determined the character of the emotion, and thereby determined, to a considerable extent, the character of the resulting physical changes. It would be idle, therefore, to pretend that we can rigidly carry out any such division as that of emotional and intellectual, desirable as we certainly hold it to be to have these states roughly in view in psycho-physical investigations. For however difficult it may be to free an Emotion from its intellectual accompaniment, we feel no hesitation in deciding that certain mental states are comparatively emotionless, while on the other hand there are mental states at once recognisable as essentially emotional, however much they may involve conception. We have seen that a vivid idea, definitely directed to a certain locality, may, without generating any emotion, induce a sensation. We have

adduced the experience of John Hunter. "I am confident," he said, "that I can fix my attention to any part until I have a sensation in that part;" words which ought to be inscribed in letters of gold over the entrance of a Hospital for the Cure of Disease by Psychopathy. Hunter's confident assertion is the more interesting, because, drawn from his own experience, it shows that the principle is not confined in its operation to the susceptible and nervous, but operates even on men of the highest mental endowments. And if calm, unimpassioned thought can thus affect sensation, how much more profoundly will an intense emotion, as Fear or Joy? "For securing attention to a limited subject, the feeling of Terror is highly efficacious" (Bain). In the next chapter we shall see the striking influence of Emotion on muscular movements, but in that influence we shall also witness its action upon sensation when the antecedent of motion. Thus the muscular action excited in vomiting is the result of the nausea we have just instanced, as a good illustration of a sensation induced by moral disgust. Subsequently, we shall study the phenomena which the emotional impulse causes in the body, perceptible by others, and in this sense objective; now, we consider those phenomena which are altogether subjective. In another sense, also, are they subjective, in that they are the result of impressions from within and not from without. While they are such states of feeling as have immediate reference to the bodily organs in their relation, ordinarily, to the external world, we approach them in a reverse order to the natural one. Disregarding the outer world and the impressions thence received by the sensory nerves,

we place ourselves in the inner world of mental Emotion, and observe the influence which streams therefrom through the sensorium, inducing various sensations determined by a variety of causes.

Our starting point, then, is this:—Emotion may act upon the sensory ganglia and centres of the nerves of sensation, so as to produce any of those sensations which are ordinarily induced by impressions upon their periphery; such sensations, although central, being referred by the mind to the peripheral termination of the nerves.

It may be assumed, in accordance with recent doctrines in regard to cortical perceptive centres, that they are also involved in the action of Emotion upon Sensation.

Besides, however, these direct and purely subjective sensations, sensation may be indirectly excited by changes in the neighbourhood of the peripheral terminations of the sensory nerves, which changes are induced by Emotion, but not through the channels of the sensory nerves. Claude Bernard, indeed, holds that the same nerve may transmit the sensory current in both directions (xciii), to and from the brain, but the sensations now referred to admit of a different explanation, being probably due to the influence exerted by the emotions upon the sympathetic nerves, as, for example, in the sensation of "creepiness" from fear, the local changes caused in the skin are impressed upon the sensory nerves at their peripheral terminations. Whenever the capillary circulation of a part is increased by emotional excitement, the sensibility is augmented, and the mind experiences sensations in the ordinary way, centripetally, although truly originating in an emotion.

And not only so, but persistent morbid feelings, may act directly upon the character of the blood, and the blood thus changed may affect the sensory nerves, and produce innumerable subjective sensations. The influence of the emotions on the blood has yet to be considered; this granted, the action of dysæmia in causing dysæsthesia is clear. The circulation of the blood, also, as well as its composition, is so much affected by emotional impulses, that from this cause likewise arise altered sensations, whether exaggerated or deadened. In respect to the special senses, a flash of light or a voice may be perceived, as every one knows, as a merely subjective sensation, from central congestion, and this congestion may be caused by intense Emotion.

Striking proofs of the induction of bodily sensations by means of psychical agency, are to be daily found in the sensations produced by mental imagery of an emotional character. The sensation of a ball in the throat and that of throttling so often caused by emotion and so familiar in cases of hysteria, may be referred to. By Romberg the *globus* is regarded as a direct subjective sensation and not an indirect one occasioned by spasm of the pharynx, which he does not believe to be present, for "liquids and solids pass equally well through the gullet." Sir Walter Scott said he did not know what other people feel, but with him "the hysteric passion that impels tears is a terrible violence—a sort of throttling sensation." The *besoin de respirer* is a nearly allied state, due, in emotional cases, to subjective irritation of the respiratory centre.

There are, however, agreeable as well as disagreeable

psycho-physical phenomena. Here, as in hypochondriasis, it is very easy to put the cart before the horse; but no one doubts that while, on the one hand, a healthy glow of bodily health acts upon the mind and causes pleasurable emotion, joy, on the other hand, induces that general sense of bodily comfort, or well-being, to which the term *cænæsthesia* is often, though not quite correctly, applied, as it should include depressing as well as buoyant feeling.

Anxiety causes innumerable organic sensations. A man pictures himself in a position of responsibility; delivering an important speech, for instance, in the House of Commons. This is instantaneously succeeded by a "qualm in the stomach." I do not now mean actual queasiness or nausea, but the well-known indescribable sensation referred to the pit of the stomach—the "epigastric centre;" others experience, instead, an equally well-marked sensation in the legs, the perinæum, or the palms of the hands.

Probably no sensation is more universally recognised as connected with Emotion than this instantaneous epigastric feeling, which may pass into a complete qualm in the sense of sickly faintness, or even into a qualm in the sense of its Saxon original—death. Milton speaks of "qualms of heart-sick agony," and the reader may be reminded of its physical correlative—the qualms of conscience. Again, I may either say I am qualmish from a moral cause, or, with Pistol, "I am qualmish at the smell of leek." The sensation in the pit of the stomach forms, no doubt, the main reason why the emotions, when not located in the heart, have been referred to the stomach by

the vulgar, and to the solar plexus by some eminent physiologists. As popular opinion refers the seat of sensational impressions, not to the sensorium, but to the peripheral, or, as indeed they are often called, the sentient extremities of the sensory nerves, so does the same authority refer the emotions to the region of the stomach or breast; the reason being that mental feelings have excited the central nuclei of the nerves which supply these organs; the centre of the emotional movements being in the medulla oblongata (see p. 172). In regard to epigastric sensations, there has always been a tendency to connect the deepest feelings of the soul with this region or the umbilicus. To this spot a monk in the eleventh century directs the thoughts to be turned in order to arrive at the highest degree of mental insight. "When thou art alone in thy cell," says he, "shut thy door, and seat thyself in a corner; raise thy mind above all things vain and transitory; recline thy beard and chin on thy breast; turn thy eyes and thoughts towards the middle of thy abdomen, and search the place of the heart, the seat of the soul. At first all will be dark and comfortless; but if thou persevere day and night thou wilt feel an ineffable joy, and no sooner has the soul discovered the place of the heart, than it is involved in a mystic and ethereal light."*

Shakespeare recognises the influence of unhappy feelings on the sensations of the alimentary canal, in the passage in which Iago says—

* See Mosheim's 'Ecclesiastical History,' and Gibbon, who in quoting the passage, characterises the light as "the production of a distempered fancy, the creature of an empty stomach and an empty brain."

“ The thought whereof
Doth, like a poisonous mineral, gnaw my inwards.”

Tylor says, in his ‘Early History of Mankind,’ that at the Berlin Deaf and Dumb Institution they push the fore-finger against the pit of the stomach to express “I;” that at the Edinburgh Institution they indicate their desire or will by placing the hand on the stomach, “in accordance with the natural and wide-spread theory that desire and passion are located there.”

In accordance with the metaphoric use of words, in this connection, it may be added that we speak of the *sickening* details of a crime, from the acknowledged influence it possesses in producing a state of nausea, which, if aggravated, would lead to actual vomiting. Sometimes our expressions are strictly figurative, at other times they pass insensibly into a description of the actual physical effect. The former is intended in such a phrase as—

“My *spirit sickens* at the hateful thought.”
JOANNA BAILLIE’S ‘ETHWALD.’

That hope deferred maketh the heart “*sick*,” is a proverb as true as it is ancient. Thus Shakespeare—

“I feel such sharp dissension in my breast,
Such fierce alarums both of hope and fear,
As I am *sick* with working of my thoughts.”
HEN. VI, Act IV, SCENE V.

The effect produced upon the abdominal region by the emotions is recognised in the interchangeableness of the terms employed in all languages to signify the physical and the mental state. In the oldest historical work

extant, we read that "Joseph made haste, for his *bowels* did yearn upon his brother; and he sought where to weep." The Heb. **יִמְיוֹ** is literally rendered in the authorised version; the association of the two ideas is therefore met with, as might be expected from its foundation in nature, in the language of the early, no less than in the later, ages of the human race; popular language being largely justified by, though needing qualification from, the anatomical and physiological teaching of the present day. The Greeks made use of the same metaphor. In the above passage, for example, the word employed in the Septuagint* is *ἐγκατα* or (as in the Oxford MS.) *σπλάγχνα*, the intestines or bowels, the word which frequently occurs in the writings of St Paul, as in the expression rendered by our translators "bowels of mercies" (*σπλάγχνα οἰκτιρῶν*) and "straitened in your own bowels." Hence, by a curious interchange of ideas, along with verbal identity, the tenderest emotions are represented in the same language as that which is employed to describe the physical circumstances attending the death of Judas Iscariot.

From profane Greek authors similar examples might be cited, but the foregoing are sufficient to mark the connection which every one's consciousness and observation have in all ages recognised between the emotions and the alimentary canal.

* The LXX in Prov. xii, 10, render it by *σπλάγχνα* (bowels, *i.e.* tender mercies).

SECTION II.—Hyperæsthesia

It may here be noted, without detailing cases, that although anæsthesia is frequently found associated with insanity, there are cases in which hyperæsthesia is equally well marked.

One marked form of hyperæsthesia of emotional origin is seen in *hypochondriasis*, although in many cases the attention paid to the impressions is, in the first instance at least, excited by a morbid condition of some organ of the body.

We may, however, with Romberg, refuse to admit cases thus originating as properly hypochondriacal. "Hypochondriasis can only be said to exist if the mind creates new sensations, which in their turn give rise to nutritive derangements. . . . The mind is productive, it creates corporeal sensations and changes; the imagination clings to its own productions and attaches itself to a given group of sensory nerves." (xxxiv, I, pp. 184-5.)

Again, the special direction of thought to one part may cause anxiety, or anxiety may induce a person to direct his thoughts to the operations of the bodily functions. The course of phenomena in hypochondriasis is not so simple as at first sight appears. However, the fact undoubtedly remains that reflection, and especially the anxious reflection, upon any of the bodily sensations, increases them to a morbid extent, and may originate a host of imaginary disorders.

SECTION III.—Anæsthesia

In cases of hysteria in which there is a loss of sensation, it is difficult to decide to what extent this condition can be fairly referred to the abnormal state of the Emotions, and frequently the invasion of the disorder is so gradual as not to be obviously connected with any special mental exciting cause; at the same time, the observations of many physicians would confirm the statement of M. Briquet, that "it is not rare to find it coming on quite suddenly after Emotion." He makes the observation, in regard to cases of hysterical anæsthesia (of 1240 of which he gives an analysis), that whatever may be the extent of the affection, whether of the whole of one side, or of the organs of sense, it only involves the parts supplied by the cerebro-spinal system, never those supplied by the sympathetic, as the intestines, lungs, &c. We are apt to lose sight of the reality and interest of cases of hysteria in general, by too summarily dismissing them as "hysterical," instead of learning a lesson from their ætiology; as a German writer exclaims, "Woe unto him who swears allegiance to a word!"

Cases, in full, of hysterical anæsthesia may be seen in the '*Gazette des Hôpitaux*' and '*Annales Médico-Psychologiques*,' 1855, p. 294.

Dr Wilks (xlv, March 27th 1869) records the case of a girl to whom he was called, who had received a great fright. She had an hysterical attack, and fell into a state in which she appeared to have altogether lost the sense of touch.

In an article in the 'Annales Médico-Physiologiques' (xxxv) "On Diseases of the Cutaneous Sensibility among the Insane," M. Auzouy, of Maréville, states that, in that institution, of 600 patients (including many demented, idiot, imbecile, and melancholy) he found more than half presented different degrees of cutaneous insensibility. He refers to the observations of M. Michéa, which prove the existence of anæsthesia in most affected with melancholia, especially among religious and suicidal lypemaniacs, and cites the case of an old man in the asylum at Dijon who received a serious wound which did not cause him any pain. The application of cupping-glasses and various irritants was not felt by him. This patient believed himself to have been dead forty years, and besought that he might be buried. By way of experiment he was literally buried up to the neck, and the only thing he complained of was that his interment was not completed. The writer observes, "I believe I have sufficiently shown that insensibility to pain is a pathological state which constitutes not solely a fortuitous event peculiar to some cases of mental alienation, but rather a very frequent symptom, of which the appearance is intimately bound up with the generality of the types of insanity. This immunity from pain, independently of the alterations of which the sense of touch may itself be the object, is witnessed in various conditions, according to the form of delirium that it accompanies; it is, in general, *proportioned to the moral lesion*, increases or decreases with it, and influences powerfully the development and progress of the diseases incident to the insane" (ix, 1860, p. 68).

The *convulsionnaires* of St. Médard in 1731, serve as

examples of anæsthesia. As numbers of these persons were thrown into this peculiar condition by causes known to be directly and purely mental, they admit of separation from cases of hysteria of vague or unknown origin, and may therefore be fairly employed as illustrations of the influence of emotional excitement upon the sensibility of the body. They were usually complicated with disorder of the motor system, especially a spasmodic condition of the muscles.

The work of Carré de Montgeron, 'La Verité des Miracles,' contains the most astonishing recitals of the blows to which the *convulsionnaires* were subjected at their own desire, without pain, and according to this author without any visible effect. Calmeil, however, observes that "many of these fanatics deceived themselves greatly in imagining themselves to be invulnerable, for there has been, scores of times, undeniable proof given that many amongst them showed, after the cruel infliction of blows which they solicited, large patches of discoloration under the skin, and innumerable contusions on the surface, which had borne the most severe assaults" (ci, ii p. 386).

In the case of the *convulsionnaire* Nisette, "She was struck on the head with a log, then with four logs, and then had the four members pulled in different directions. . . . At length two men stood on her body, then one man stood on her back, two others dragged up her arms, and gave her the *strapado*. They pulled her arms and legs, one person being on her stomach, they suspended her by the feet, then balanced her by the arms and legs, a man being on her back; then they turned her round like a spit, then again dragged her by the four members,

two persons also pulling from below the shoulders. This pulling continued for a long time, because there were only six persons to pull (!) After that, they again gave her the *strapado* and the ordinary *sape à la muraille*; then they trod her under foot, fifteen persons at a time." (op. cit. p. 370).

The insensibility to pain in these cases appears to have been complete. The slight extent to which the internal organs suffered seems to be best explained by the extreme rigidity of the muscles, which was a marked feature of the phenomena—a rigidity so frequently produced with great ease by hypnotic manipulations.

The distraction of the attention from impressions made upon the sensory nerves, whether painful or pleasurable, when the mind is under the influence of powerful Emotions, notoriously interferes with or entirely prevents the mind's perception of them; this principle forms the foundation of a large class of cases of psychical anæsthesia. Rapt in ecstasy, the devotee feels neither cold nor wounds. In those cases of hypnotism in which anæsthesia, but not complete sleep, is induced, the immunity from pain arises from the occupation of the thoughts or ideas in another direction. Of course in those cases in which there is profound slumber, the insensibility is not due to the same principle, although the sleep may have been originally produced by mental influences. Mr Braid found that if a patient *expected* an operation, his suggestions and his endeavour to absorb the mind in another subject were apt to prove unsuccessful. This, however, does not necessarily involve emotional excitement, though it is, no doubt, often present.

The battle field constantly affords examples of the influence of an engrossing emotion in blunting sensation. In reporting the battle of Monte Rotundo (1867) a spectator writes in the 'Cornhill Magazine':—"All day long the battle raged; the troops were fainting with hunger and fatigue. Certainly they were the liveliest, most patient set of sufferers I ever saw; *the certainty of victory chloroformed their pain.*"

A striking case of anæsthesia caused by emotional excitement is recorded by Professor Ball (ciii, No. 1, 1881, p. 16). The patient had fallen into a passion with his mother-in-law. There was left hemi-anæsthesia, and no blood appeared when the skin was transfixed with a pin. The sense of temperature was also absent on the same side, so of the sensibility of the mucous membranes. Tickling the left nostril failed to induce sneezing, which was immediately caused by tickling the right; the tongue was insensible on the left side, as well as the mucous membrane of the left cheek and pharynx. A distinct median line separated the sensitive from the anæsthetic half of the body. Smell and taste were suppressed, and sight weakened on the left side. The deafness, however, was complete on both sides.

SECTION IV.—Paræsthesia

The sensations of heat and cold are notably caused by emotional disturbance.

"I have a faint cold fear thrills through my veins,
That almost freezes up the heat of life."

ROMEO AND JULIET, ACT IV, SC. 3.

The commission appointed by the King of France, in 1784, to report to the Academy of Sciences on the claims of Animal Magnetism, reported, among other phenomena they observed, that without touching "the subject" or employing any means whatever, he experienced pain and very great warmth (*une chaleur très grande*), simply from expectation.

It is clear that Fear may not only cause the subjective sensation of cold, but may also reduce the temperature by its action upon the vaso-motor nerves.

Instances occur daily of cold extremities from painful emotions ; warmth being soon restored, if Hope or Joy be substituted for "cold Fear."

The influence of Shame on the external ear, as well as the cheek, is proverbial. The expression "a burning shame" is not a mere figure, but involves and has its origin in the actual sensation of heat—

"Mine ears that to your wanton talk attended,
Do burn themselves for having so offended."

VENUS AND ADONIS.

Erasmus Darwin relates the following. Although the exposure to the cold of a frosty night had, no doubt, considerable influence in causing a chill in the first instance, the power of Fear in sustaining the morbid and purely subjective sensation of cold afterwards, cannot be denied.

"A young farmer in Warwickshire, finding his hedges broken and the sticks carried away during a frosty season, determined to watch for the thief. He lay many cold hours under a haystack, and at length an old woman, like a witch in a play, approached, and began to pull up the

hedge; he waited till she had tied up her bottle of sticks, and was carrying them off, that he might convict her of the theft, and then springing from his concealment he seized his prey with violent threats. After some altercation, in which her load was left upon the ground, she kneeled upon the bottle of sticks, and raising her arms to heaven beneath the bright moon, then at the full, spoke to the farmer, already shivering with cold, '*Heaven grant that thou never mayest know again the blessing to be warm.*' He complained of cold all the next day, and wore an upper coat, and in a few days another, and in a fortnight took to his bed, always saying nothing made him warm; he covered himself with very many blankets, and had a sieve over his face as he lay; and from this one insane idea he kept his bed above twenty years, for fear of the cold air, till at length he died" (lxxv, ii, p. 359).*

The observation is made by Dr Rush, that soldiers favoured by the fortune of war remain comparatively insensible to cold. During the American war the Philadelphia Militia, accustomed to the comforts of city life, slept after the battle of Trenton in tents and barns, or in the open air, in the coldest months of the year; yet in the course of six weeks only two were ill, and there was but one death. Dr Rush says he can only account for the healthiness of so large a number of men under such circumstances by the vigour infused into the human body by the victory of Trenton having produced insensibility to all the usual remote causes of disease.†

* Upon this case Wordsworth founded his poem, '*Goody Blake and Harry Gill*': a true story.'

† Some of these examples belong equally to the influence of the

No one will doubt that the sensations of *hunger* and *thirst* are modified—aroused or dulled—by the condition of the mind. A child hears water mentioned and experiences a desire to drink in consequence. With the drunkard, the mental image of a glass of spirits will excite his peculiar thirst for drink. Persons are often thirsty when, as every one knows, if the attention be diverted, the sensation disappears. But apart from these examples of the influence of ideas—the imagination—there are cases in which emotional excitement tends to create thirst. Thus, it has been observed at the commencement of an engagement. Dr Rush, in his essay on the ‘Influence of the American Revolution upon the Human Body,’ says he noticed thirst to be a very common sensation among both the officers and soldiers. He adds that it occurred when no exercise or action of the body could have excited it (lxi, i, p. 128). This is the more striking, because the circumstance of the mind being concentrated upon another subject failed to extinguish this sensation.

The influence of Emotion in causing hunger is curiously illustrated by the following :

A bookseller lately informed me as a singular circumstance that a pecuniary loss exerted an extraordinary effect upon his appetite. A gentleman had bought a large number of books, and sent a cheque for them. On presenting it to the bank the bookseller found that it was worth so much waste paper. The loss was very considerable and of course occasioned much disappointment and mind on the walls of blood-vessels, and under the head of “involuntary muscles” we shall refer to the researches of Lombard again.

vexation. It was succeeded, however, by an unusual craving for food. He sent out for some beef steak and ate one of the heartiest meals that he had ever done in his life. Moreover, from that time his loss caused him no concern. Dearly bought as the pleasure of his meal was, he seemed hardly to regret it.

SECTION V.—Dysæsthesia

When illustrating the influence of emotional states upon vascularity, several examples will be given in which pain was present as one of the results. There are other cases in which the vascularity is either not marked or altogether secondary, and in which severe pain is the prominent and primary symptom ; being the consequence of the fear of pain, or the witnessing the signs of pain in others.

During an *émeute*, some years ago, in Paris, a trivial event happened, and is related by Gratiolet (xv, p. 286), which is a good illustration of the effect produced upon sensation by psychical impressions. A company of soldiers and National Guards, engaged in the Rue Planche-Mibray, were exposed for a few moments to a murderous fire from all sides. One of the combatants received a slight contusion from a reflected ball upon the shoulder, and scarcely noticed it. After the skirmish, however, experiencing a momentary pain in the part which had been struck, and fancying in his fright he had received a more severe injury, he felt a stream of blood flowing down the side of his chest from the wound. "He distinctly felt it, yet the skin had not even been broken."

Gratiolet (*loc. cit.*) also mentions two medical students, engaged in dissection, one of whom playfully struck the other's extended finger with the back of his scalpel. Frightened, and imagining that he was cut, he uttered a terrible cry, and when he discovered his mistake, averred that the pain was so acute, that he thought the instrument had penetrated to the bone.

One of my friends, on hearing of a relative's hand having been injured by a pistol-shot, felt an acute pain not far from the spot, and turned very pale.

Professor Bennett's case of a terrified butcher, who, on trying to hook up a heavy piece of meat, slipped, was suspended by the arm by the hook, and when taken to a chemist, said he suffered acute agony, is well known. The hook had only traversed his coat, the arm was uninjured, and yet through fear he cried out with "excessive pain" when the sleeve was cut off in order to allow of the arm being examined.

An excellent example of the influence of emotional excitement in the form of a fearful belief, in causing a corresponding sensation, is given by Dr Noble (*lxv*, p. 120) on the authority of Dr Whitehead:

"Mons. Boutibonne, a man of literary attainments, a native of Paris, served in Napoleon's army, and was present at a number of engagements during the early part of the present century. At the battle of Wagram, which resulted in a treaty of peace with Austria, in November, 1809, Mons. Boutibonne was actively engaged during the whole of the fray, which lasted, if I rightly remember, from soon after midday until dark. The ranks around him had been terribly thinned by the enemy's shot, so

that his position at sunset was nearly isolated ; and while in the act of reloading his musket, he was shot down by a cannon-ball. The impression produced upon his mind was that the ball had passed from left to right, through his legs below the knees, separating them from his thighs, as he suddenly sank down, shortened, as he believed, to the extent of about a foot in measurement, the trunk of the body falling backwards on the ground and the senses being completely paralysed by the shock. In this posture he lay motionless during the remainder of the night, not daring to move a muscle for fear of fatal consequences. He experienced no severe suffering ; but this immunity from pain he attributed to the stunning effect produced upon the brain and nervous system. ‘My wounded companions,’ said he, ‘lay groaning in agony on every side, but I uttered not a word, nor ventured to move, lest the torn vessel should be roused into action and produce fatal hæmorrhage, for I had been made acquainted with the fact that the blood-vessels, wounded in this way, did not usually bleed profusely until reaction took place. At early dawn, on the following morning, I was aroused from a troubled slumber by one of the medical staff, who came round to succour the wounded. ‘What’s the matter with you, my good fellow?’ (*Qu’a-t-il, mon camarade!*) said he. ‘*Ah! touchez-moi doucement, je vous prie;*’ I replied, ‘*Un coup de canon m’a emporté les jambes.*’ He proceeded at once to examine my legs and thighs, and giving me a good shake, with a *ris de joie* he exclaimed, ‘*Faites-vous lever d’abord, vous n’avez rien de mal.*’ Whereupon I sprang up in utter astonishment, and stood firmly on the legs which I believed had been lost to me

for ever. I felt more thankful than I had ever done in the whole course of my life before. I had not a wound about me. I had, indeed, been shot down by an immense cannon-ball, but instead of passing through my legs, as I firmly believed it to have done, the ball had passed under my feet, and had ploughed away a cavity in the earth beneath, at least a foot in depth, into which my feet suddenly sank, giving me the idea that I had been thus shattered by the separation of my legs. *Voilà ce que se fait-il le pouvoir d'imagination."*

SECTION VI.—Special Senses

The influence of Emotion in exciting the sense of sight is illustrated by many ghost stories, visions, &c. The expression of Coleridge, in regard to this class of phenomena, is a happy one. "The imagination, under (emotional) excitement, generates and produces, a form of its own." The state of the feelings at the time will determine the character of phantasms, whether fearful or agreeable. Those who believe in real visitations from the other world, and have any knowledge of physiology, do not deny that there are subjective as well as objective ghosts.

All this is true as fact—whether we hold that the sensory centres are called into activity every time we recall to the mind the localities which we have visited, or the sounds we have heard, in accordance with the position taken by Bain and others, that a sensation, and the remembrance of a sensation, involve the same portion of

the brain—or whether we believe that the mere recollection of an object is a purely ideational act,* involving only those portions of the cerebral cortex, which are not in direct communication with the special sense organs, while nothing short of the presence of distinct hallucinations or illusions of the senses, as ocular spectra, implies the activity of the sensory perceptive centres.

Are the organs of sense—the distal extremities of the sensory nerves—themselves affected by emotional excitement? In other words, is such central hyperæsthesia transmitted to the peripheral terminations of the nerves? The remarks already made on the Influence of the Intellect upon Sensation (Chapter II) apply here also, *mutatis mutandis*. It is obvious that our present standpoint does not necessarily extend beyond the central terminations of the sensory nerves. It is sufficient that we allow that these can be excited by an emotional impulse, to account for all the subjective sensorial phenomena which follow, without supposing any centrifugal change to take place in the course of these nerves or in their peripheral expansions.

We know that a man who labours under amaurosis can still behold spectra; that if he is deaf, he can still hear an audible voice; or can smell, though his olfactory nerve is destroyed;—and, therefore, it cannot be needful to suppose any centrifugal action along the course of the nerves of sense. This remains a secure position to take, even if it be true that this backward action—retransmission—can occur.† No physiologist has gone further than Müller

* See p. 73 of this work.

† That accomplished physician, the late Dr Symonds, observes—

n maintaining that it can and does ; in fact, I venture to think that, while admitting that the internal parts of the apparatus of vision are alone essential to the production of certain phenomena, he confounds two views which are distinct—the one, that sensorial phenomena of subjective origin are as truly states of sensation as those excited objectively ; the other, that, in the former case, there is usually a current along the nerve from centre to periphery. He is right when he says that phantasms and visions are not to be confounded with mere ideas ; but when he says that they are seated “in the senses,” and that the idea in the sensorium excites the active state of particles in the retina, it would be clearer to substitute the expression that the idea in the cerebral hemispheres excites the action of the sensorium and the central terminations of the sensory nerves, so as to produce the same effect as if excited by a peripheral impression.

With regard to a question sometimes asked—are the subjective sensorial phenomena or sensations which arise from an internal stimulus like an emotion, as real as those

“ I do not see any *impossibility* in such a transmission, when the impression is unnaturally vivified ; and it appears, indeed, somewhat probable, from the well-known fact that those parts of the nervous system which have been used to be associated in their action, are ever ready to sympathise ; and thus, when a certain part of the brain immediately concerned in the recalled impression is, from some cause or other, excited, and which, from its connection, had often been excited at the same time with a spot on the retina, the latter becomes likewise affected. But though we admit the probability of such consenting action, what has been already said is, I trust, sufficient to show that the reproduction of the sensation takes place independently ” (xxvi, p. 244).

excited by an external object?—it is obvious that as sensation, and the consciousness of an impression made upon the nerves, are the same thing, and as this function is seated in the sensory centres, and not the periphery of the nerve, it is as truly a sensation, whether the sensorium is reached from within or from without; whether acted upon from above or below. The individual who thinks he sees an object, which is not present to excite the optic nerve, ought to be told—not that he is wrong in saying he is conscious of the sensation experienced, but in supposing that that sensation consists of the consciousness of an impression produced upon the peripheral termination of the nerve by an external object.

In the majority of cases of false sensations of mental origin, expectant attention appears to be the chief element in the causation, and we have had occasion to refer to several interesting cases in a previous section. In some, however, although a state of expectancy is also present, Fear itself has generated this expectant condition, and in illustration of this the two following cases may be mentioned. The first has reference to the sense of smell.

(a) *Olfactory*.—When, during the reign of Charles I, the Parliament was at issue with the King, and there were rumours of dangerous plots, report was made to the House of one (without foundation) which was designed to blow up the members. During its reading some stood up alarmed, including “two very corpulent members,” whose weight broke a board in the gallery, which gave so great a crack, that some thought there was a plot indeed, and Sir John Ray cried out that he *smelt* gunpowder. The result was a panic in the House, and throughout

London, followed by an armed band marching to Westminster to defend the House from this imaginary gunpowder plot !

(*b*). *Ocular*.—The effect of alarm and imagination in health upon the sense of sight, as well as upon feeling, is exceedingly well illustrated by the following account given by Mr Braid :

“ Two captains of merchant vessels arrived in port at the same time, and both went to take up their quarters in their usual lodgings. They were informed by the landlady of the house, however, that she was very sorry that she could not accommodate them on that occasion, as the only bedroom which she could have appropriated for their use was occupied by the corpse of a gentleman just deceased. Being most anxious to remain in their accustomed lodgings, almost on any terms, rather than go elsewhere, they offered to sleep in the room wherein the dead body was laid out. To this the landlady readily gave her assent, considering it better, so far as *she* was concerned, to have three such customers in her room than only one, and he a dead one. Having repaired to bed, one of the gentlemen, who was a very great wag began a conversation with the other by asking him whether he had ever before slept in a room with a corpse in it, to which he replied ‘No.’ ‘Then,’ said the other, ‘are you aware of the remarkable circumstance that always, in such cases, after midnight, the room gets filled with canaries, which fly about and sing in the most beautiful manner?’ His companion expressed his surprise at this. But no sooner said than realised ; for, the candle having been put out, presently there was a burst

of music, as if the room really was full of canaries, which were not only *heard*, but at length the horrified novice in the chamber of death avowed that he both *saw* and *felt* the birds flying in all directions and plunging against him. In a short time he became so excited, that, without taking time to do his toilet, he rushed downstairs in in his nightdress, assuring the astonished household of the fact, and insisting that the room really was *quite full of birds*, as he could testify from the evidence of his senses, for he had not only *heard* them, but also *seen* and *felt* them *flapping their wings against him*" (xx, p. 88). The captain had some excuse for saying he *heard* them although not for seeing or feeling them, for his companion had really imitated the note of the canary by blowing through a reed dipped in water.

Pettigrew cites from Dr Reid "the case of a woman who was almost blinded by fright, in witnessing a paroxysm of epilepsy with which her husband was affected in the night. In one eye the vision was completely destroyed; in the other the capacity of seeing was intermittent, 'going and coming,' as she herself described it, 'like the sun when a cloud passes over it'" (lxxvi, p. 101).

(c) *Auditory*.—In the following case, deafness was caused by fright. It is given by Sir Astley Cooper and quoted by Pettigrew: "A child ten years of age, who wanted to write her exercise and to scrape her slate pencil, went into the school in the dark to fetch her knife, when one of her schoolfellows burst from behind the door to frighten her. She was much terrified, and her head ached. On the following day she became deaf, and on

the next, so much so as not to hear the loudest talking Sir Astley saw her three months after this had happened, and she continued in this deplorable state of deafness." (lxxvi, p. 99.)

Mr Dalby informs me that he has had several remarkable cases of deafness from mental causes fall under his notice. He made the following reference to them in his Address as President of the Section for "Diseases of the Ear," at the International Congress in 1881.

"I have known the hearing in apparently healthy subjects to be almost completely lost on the witnessing a sudden death of a near relative, on several occasions immediately upon the receipt of news of a painful nature, in the case of women upon the fright produced by a cry of fire or an alarm of burglars in the house, at the witnessing of the terrible sight of a man cutting his throat; once on the receipt of great good fortune which had not been anticipated. On each of these occasions the hearing power of the patient was always perfectly good up to the time of the catastrophe, and immediately afterwards the deafness was intense, so that the change in all probability was almost instantaneous." Mr Dalby suggests that there was a sudden hyperæmia in some portion of the brain, or perhaps in the medulla at the origin of the auditory nerve. (xciv, iii, p. 340).

I am not aware that there is any proof of hyperæmia. Rather would it seem likely that there is a sudden molecular change in the nervous tissue destroying for a time the continuity in the course of the auditory track. Or if the change be vascular, it seems more probable there

is capillary spasm. It is difficult, however, to see why it should persist so long, a difficulty which also applies to the theory of hyperæmia. Whatever the solution may be, it does not explain satisfactorily why, when the shock passes through the optic nerve, the organ of hearing suffers.

Professor Ball of Paris holds the view that localised spasm or cramp of the vessels—cerebral ischæmia—is the true explanation, and he records the following case.

In May 1879, C. D—, æt. 26 was in good health when he had a quarrel with his mother-in-law and fell into a violent passion. Trembling with emotion he went home and related to his wife what had passed, but to his astonishment he found that he was deaf, and moreover he could not speak. Frightened at his condition he wrote on a piece of paper the name and address of a doctor, showing the clearness of his mind. The next day at four o'clock in the afternoon he suddenly recovered the power of speech. He remained however completely deaf in both ears. He also laboured under left hemi-anæsthesia (see under "anæsthesia"). The senses of *smell* and *taste* were abolished on the same side; that of *sight* weakened. There was a slight degree of left facial paralysis, and the left arm was weak. The tongue deviated to the left side.

The application of galvanism removed the affection. The tactile sensibility first increased and on the fourth application the patient heard a loud cracking in the right ear, as if something had burst in his head, and hearing was instantly restored. At the same instant sensibility fully returned and he was quite well.

It remains to add that a year afterwards the patient had a return of the symptoms without any emotional cause, and was relieved by the same treatment. Two months subsequently, a violent emotion caused a relapse and he was for the third time deaf and dumb, and anæsthesia on the left side. He was again treated and relieved by galvanism (ciii, No. 1, 1881).

(*d*) *Gustatory*.—See the above illustration of the influence of the emotions on the sense of taste. Hysterical cases of hemi-anæsthesia, in which this sense is involved, may also be referred to.

(*e*) *Tactile*, (see *Æsthesia*).

In concluding this chapter, we may briefly state the principles which lie at the foundation of the influence of the Emotions upon sensation, exciting, as stated at the commencement, ordinary sensations, excessive and morbid sensations, or suspending them altogether.

1. Thought strongly directed to any part tends to increase its vascularity, and consequently its sensibility. Associated with a powerful emotion, these effects are more strikingly shown. And, when not directed to any special part, an excited emotional condition induces a general sensitiveness to impressions—an intolerance of noise, for example, or cutaneous irritation.

2. Thought strongly directed away from any part, especially when this is occasioned by Emotion lessens its sensibility. As the activity of the cerebral functions during deep intellectual operations excludes consciousness of the impressions made upon the sensory nerves generally, so an absorbing emotion effectually produces the same result.

3. The emotions may cause sensations, either by directly exciting the sensory centres and the central extremities of the nerves of sensation, or by inducing vascular changes in a certain part of the body, which excite the sensitive nerves at their peripheral terminations.

4. There is no sensation, whether general or special, excited by agents acting upon the body from without, which cannot be excited also from within by emotional states affecting the sensory centres ; such sensation being referred by the mind to the point at which the nerve terminates in the body.

CHAPTER VIII

INFLUENCE OF THE EMOTIONS UPON THE VOLUNTARY MUSCLES

THE Emotions, by their action on the neuro-muscular system, may cause—

- I. Co-ordinate contraction and relaxation ; Movements.
- II. Irregular and excessive contraction : Spasms and Convulsions.
- III. Loss of power : Paralysis.

SECTION I.—Muscular Contraction and Relaxation

The ordinary influence of Emotion upon the muscles is most marked upon those of the face—"the Dyall of the affections"—and as we shall find it convenient to include the muscles engaged in Respiration in the consideration of the action of the emotions on the voluntary muscles, it must be added that they are strikingly influenced by emotional changes ; less, but sufficiently distinctive, is the effect produced upon the limbs, especially the hand. The question—to what extent the influence of the mind on the facial muscles is direct or through the

heart and lungs, will be referred to subsequently. As Expression depends on the contraction and relaxation of the muscles, the relation between Emotion and muscle becomes of great interest and importance in a physiological point of view, including in this all the fleeting expressions, gestures, and attitudes to which the passions of the soul subject the body. The predominance of one emotion, or of emotions of one class, may cause, however, more than evanescent expressions—may determine the settled character of the features, and is the basis of physiognomy as distinguished from mere pathognomy—emotions of a noble and lofty character tending to produce a refined, and those of a sensual character, a debased type of expression, which may become not only permanent in the individual but hereditary.

As Scott describes Bertram's features in 'Rokeby':—

“ For evil passions cherish'd long
Had plough'd them with impressions strong.”

On the contrary, as Ruskin says, “there is not any virtue, the exercise of which even momentarily, will not impress a new fairness upon the features, neither on them only, but the whole body.”

Let us consider now the most striking and familiar effects of strong emotion upon muscular contraction and relaxation.

Joy excites the whole muscular system, producing, when excessive, laughter, rapid motions of the limbs, dancing, running, leaping, throwing the arms about, and clapping or rubbing the hands. When moderate, the mouth relaxes into a smile from contraction of the zygo-

matic, involving with it the smile of the eyes from action of the orbicularis palpebrarum. The levator labii raises the upper lip and shows the teeth. The broad grin of Joy contrasts with that of Hate. The effects of Joy, as contrasted with those of Grief, were well exhibited in the Barnsley Colliery Explosion of 1866, when, after a period of suspense, two men reached the top in safety—one of them having volunteered to seek for any that were still living, and succeeded in bringing the other in safety. “They were nearly pulled to pieces by the delighted engineers, who seized them, shook hands with them, stripped them, scrubbed and congratulated them till they were almost overdone.”

The brightness of the eye in joy is due to several causes; one would appear to be the action of the ocular and possibly the orbicular muscles in rendering the eye-balls tense.

The signs of Joy may closely border upon those of Fear, because the mind pictures to itself the possible prevention or removal of the sources of its joy—

“Vix sum apud me, ita animus commotus est metu
Spe, gaudio, mirando hoc tanto, tam repentino bono.”

ANDRIA, ACT V, SC. IV, l. 34—5.

Here Terence in representing Pamphilus as labouring under mixed and contending feelings, recognises the psychological fact that Fear and Joy are simultaneously caused by glad tidings.

The nostrils are dilated, the angle of the mouth, the eyelids, and the eyebrows are raised by pleasurable, and depressed by painful feelings. The activity of the vocal

muscles is excited by Joy, giving a characteristic tone to the voice, but it may be too rapid to allow of intelligible articulation—

“ *With hurried voice and eager look,
‘Fear not,’ he said, ‘my Isabel!
What said I—Edith!—all is well—
Nay, fear not—I will well provide
The safety of my lovely bride—
My bride?’ but there the accents clung
In tremor to his faltering tongue.*”

‘LORD OF THE ISLES,’ CANTO II, xix.

Still further embarrassment is caused by increased frequency of swallowing.

The muscles directly engaged in respiration are excited, and indirectly induce changes which more properly belong to the organic functions.

In explaining the action of Joy on the muscles, Darwin observes, “with animals of all kinds the acquirement of almost all their pleasures, with the exception of those of warmth and rest, are associated, and have long been associated with active movements as in the hunting or search after food, and in their courtship; moreover, the mere exertion of the muscles after long rest or confinement is in itself a pleasure, as we ourselves feel, and as we see in the play of young animals. Therefore, on this latter principle alone, we might, perhaps, expect that vivid pleasure would be apt to show itself conversely in muscular movements” (xcv, p. 77).

Of the sounds produced during the laughter of Joy, Darwin observes, “we can see in a vague manner how the utterance of sounds of some kind would naturally

become associated with a pleasurable state of mind ; for throughout a large part of the animal kingdom, vocal or instrumental sounds are employed either as a call or as a charm by one sex for the other. They are also employed as the means for a joyful meeting between the parents and their offspring, and between the attached members of the same social community. But why the sounds which man utters when he is pleased have the peculiar reiterated character of laughter we do not know. . . . This is an equally obscure point why the corners of the mouth are retracted and the upper lip raised during ordinary laughter” (xcv, p. 207).

Grief.—In the early stage of Grief, acute pain induces wringing of the hands, grinding the teeth, tearing the hair, sobbing and groaning. Its influence on the power of speech, when extreme, is well described by Capulet in ‘Romeo and Juliet’—

“ Death, that hath ta'en her hence to make me wail,
Ties up my tongue, and will not let me speak.”

Yet not less true is the description of hopelessness, in its chronic form, by Collins in his Ode to the Passions.

“ With woful measures, wan despair,
Low sullen sounds, his grief beguil'd ;
A solemn, strange, and mingled air,
'Twas sad by fits, by starts 'twas wild.”

While Hope :—

“ ——— with eyes so fair :
Enchanted smil'd, and wav'd her golden hair.”

In a later stage Grief induces feeble respiratory movements and sighing, and produces on all the muscles very

different effects from Joy. They are, in fact, the natural result of pain which has been felt to such a degree as to exhaust the system ; the flaccid muscles now droop under their own weight, those of the cheek, especially, tending to produce by their action on the eyelids the familiar expression of sadness.

The antagonism, in Grief, to the orbicularis palpebrarum, corrugator supercilii, and pyramidalis nasi, indicated by the obliquity of the eyebrows, has led Darwin to propose an ingenious explanation, after being, he says, sorely puzzled to discover one. One sunny day he met a girl whose eyebrows as she looked up at him, became very oblique, and the forehead furrowed. On returning home he made three of his children gaze at the top of a tall tree standing against an extremely bright sky. The above mentioned grief muscles were energetically contracted to protect the eyes from the glare. In still trying to look upwards a struggle occurred between them and the frontalis muscle, especially between its central fasciæ and the pyramidalis nasi. The effect was precisely the same as witnessed in grief or anxiety. Children contract the grief muscles when they scream, for the purpose of, in the first instance, compressing their eyes and so protecting them from being gorged with blood, and afterwards from habit. "I therefore," says Darwin, "expected to find with children, that when they endeavoured either to prevent a crying-fit from coming on, or to stop crying, they would check the contraction of the above-named muscles, in the same manner as when looking upwards at a bright light ; and consequently that the central fasciæ of the frontal muscle would often be

brought into play." Mr Darwin observed children under such circumstances, and found this to be the case. He met for instance a little girl who had been frightened by a dog, and when he inquired the cause, "she stopped whimpering, and her eyebrows instantly became oblique to an extraordinary degree. Here then as I cannot doubt we have the key to the problem, why the central fasciæ of the frontal muscle and the muscles round the eyes contract in opposition to each other under the influence of grief, whether their contraction be prolonged, as with the melancholic insane, or momentary from some trifling cause of distress. We have all of us as infants contracted our orbicular, corrugator, and pyramidal muscles, in order to protect our eyes whilst screaming; our progenitors before us have done the same during many generations; and though with advancing years we easily prevent, when feeling distressed, the utterance of screams, we cannot from long habit always prevent a slight contraction of the above-named muscles; nor indeed, do we observe their contraction in ourselves or attempt to stop it if slight. But the pyramidal muscles seem to be less under the command of the Will than the other related muscles; and if they be well developed, their contraction can be checked only by the antagonistic contraction of the central fasciæ of the frontal muscle. The result which necessarily follows, if these fasciæ contract energetically, is the oblique drawing up of the eyebrows, the puckering of their inner ends, and the formation of rectangular furrows on the middle of the forehead. . . . In all cases of distress, whether great or small, our brains tend through long habit to send an order to certain mus-

cles to contract, as if we were still infants on the point of screaming out ; but this order we, by the wondrous power of the Will, and through habit, are able partially to counteract, although this is effected unconsciously, as far as the means of counteraction are concerned." (xcv, p. 193).

As already observed when speaking of Joy, the angles of the mouth are depressed in Grief, by the action of the depressores anguli oris. The explanation is referred by Darwin to the same general principle as the obliquity of the eyebrows. Children when they scream not only contract the orbicular muscles and so draw up the lip, but, in order to keep the mouth open, the depressors of the angles of the mouth act strongly. In grief or low spirits the same will happen, for "as the depressors have been repeatedly brought into strong action during infancy in many generations, nerve-force will tend to flow, on the principle of long associated habit, to these muscles as well as to various other facial muscles, whenever in after life even a slight feeling of distress is experienced. But as the depressors are somewhat less under the control of the Will than most of the other muscles, we might expect that they would often slightly contract whilst the others remained passive. . . . The above actions (including a slight suffusion of tears) may be considered as rudimental vestiges of the screaming fits, which are so frequent and prolonged during infancy." (xcv, p. 197).

Contrast the mild facial expression and crouching attitude of Humility with the firm and decisive tread of Pride, the head erect or thrown back, the mouth firm

and compressed, or displaying a characteristic smile—"Pride smiling stern," as Beattie expresses it.

"The lip of Pride, the eye of flame,
The full drawn lip that upward curl'd,
The eye that seem'd to scorn the world."

'ROKEBY,' CANTO I, viii.

Familiar and striking are the characters Pride takes when it amounts to contempt, or scorn, disdain, sneering, and defiance. Darwin, who points out that they can hardly be distinguished although they may be expressed in different ways, refers to the slight uncovering of the canine tooth on one side (*levator labii superioris alæque nasi*) which may occur and which passes into a derisive laugh or a sneering smile; and also to the feature insisted upon by Duchenne, the partial closing of the eyes, or averting them, or turning the whole body away, the signification of which is clear, namely that an individual is too contemptible to be taken any notice of. Disgust, a closely allied feeling, is indicated by signs of revulsion, especially about the mouth and in the action of the hands. Expulsive movements of various kinds are observed, as spitting, and protruding the tongue which is proverbially insulting. The Abyssinians, the Australians, the Malays of Malacca, the Fuegians, and negroes, are all known on the testimony or travellers to manifest their contempt by spitting, (xcv p. 261). The exposure of the canine tooth referred to as occasionally seen in sneering has been worked out by Darwin in a very interesting manner. "I have seen it exhibited," he says "with perfect distinctness by a lady who was being quizzed by another person. It was described by Parsons (Transact. Philosoph. Soc., App. 1746

p. 65) as long ago as 1746 with an engraving, showing the uncovered canine on one side. Mr Rylander, without my having made any allusion to the subject, asked me whether I had ever noticed this expression, as he had been much struck by it. He has photographed for me a lady who sometimes unintentionally displays the canine on one side, and who can do so voluntarily with unusual distinctness. . . . The action is the same as that of a snarling dog; and a dog when pretending to fight often draws up the lip on one side alone, namely that facing his antagonist. Our word *sneer* is in fact the same as *snarl*, which was originally *snar*, the *l* "being merely an element implying continuance of action." (Wedgewood). I suspect that we see a trace of this same expression in what is called a derisive or sardonic smile. The lips are then kept joined or almost joined, but one corner of the mouth is retracted on the side towards the derided person, and this drawing back of the corner is part of a true sneer." (xcv, p. 251).

A man may express his sovereign contempt of a person who asks a favour of him, by a shrug of the shoulders. He affects to be unable to do anything. To an Englishman the motion is an irritating one, but on the Continent it would seem generally to imply no more than helplessness, or a negation, as when you ask a man to explain any circumstance and he indicates that he cannot do so by shrugging the shoulders. It is difficult to see why the muscles which cause this action should be called "the patience muscles." Darwin says "this gesture implies an unintentional or unavoidable action on our part, or one that we cannot perform; or an action performed by

another person which we cannot prevent. It accompanies such speeches as "it was not my fault;" "it is impossible for me to grant this favour;" "he must follow his own course, I cannot stop him;" and Darwin might have added, "I don't care," a phrase indicative of the mental attitude which leads us to refer to it under Contempt.

"The attitude of the proud courser magnificently caparisoned, or of the cock that has just vanquished his enemy, coincides with the attitude of the proud man, so far as the relation of the form of these animals to that of man permits it. In each case the head is high, the movement grave and measured" (Gall, xxii, iv).

With this, Gall contrasts the expression of **Vanity** :—
"Observe in his cage either a canary bird or a goldfinch ; while you address him in a kind tone, you will see him turn from side to side, and answer you in affectionate accents expressive of his pleasure." "One of my bitches is never happier than when she is carrying my slippers in her mouth. Charmed with this honorable burden she bridles up, and wriggles her whole body, and the more I exclaim 'Fine Stella, fine Stella !' the more animated are her movements, and she passes from one to another, to obtain a tribute of admiration. She might have been likened to a country damsel, in a new gown on her way to church, wriggling to and fro, with head up, neck stiff, and chest protruded, to draw upon herself the envious looks of her companions. This same bitch, that had always been very lively and fawning, became suddenly afflicted with a sullen sadness, and in spite of all I could do to enliven her, she continued lying in her corner. After two years of melancholy she suddenly resumed her

former gaiety, and began to caress me with her ordinary liveliness and affection. In the course of the same day I learned that a squirrel, which I had had in the house for two years, had been killed. Never was unquiet, vain, and jealous courtier more deeply wounded than was this poor brute by the presence of a strange animal" (xxii, iv, p. 190, v, p. 282).

The attitude of the man affected with Vanity is the opposite to that of Pride, although both are founded in selfish feeling. "*L'orgueilleux*," observes Descuret, "*s'élève ; le vaniteux s'étale.*"

The characteristics of Envy or Jealousy are well described by the same author. "When misfortune happens to his rival, there is an infernal smile upon his thin lips ; if fortune is his lot, his features immediately contract, his eyebrows meet, his eyes become sunk in their sockets, his figure already meagre* seems to become stunted ; in short, the envious man grows thin with the good fortune of another. If he hears read any production of remarkable merit, he is silent, but, while fancying that he conceals, he betrays himself nearly always to an acute observer by a slight clattering of the feet, as if he wished in some sort to avenge his vexation on the ground" (lxvi, p. 599).

It is from the same motive that men bite their lips with jealous vexation.

"But gnawing Gealosy, out of their sight,
Sitting alone, his bitter lips did bight."

THE FAERIE QUEENE.

Fear amounting to Terror, by causing spasmodic respi-

* 'Leanfaced.'—(Shakspeare.)

ration, may, as in grief, choke the utterance; or the voice is husky. The facial expression is that of dyspnœa. In describing painful respiration, Gratiolet observes—“ Ces mouvements ont pour cause immédiate les contractions de ce muscle peaussier du cou (platysma myoides*), dont la partie faciale a reçu de l'anatomiste Santorini le nom de muscle rieur, *risorius*, sans doute par antiphrase, car ce prétendu risorius est le muscle de la dyspnée mortelle, de l'angoisse et de l'épouvante ” (xv).

Darwin, who enters minutely into the cause of the action of the platysma myoides in contracting with the shiver of Fear, arrives at the conclusion that the first sensation of Fear or the imagination of something dreadful commonly excites a shudder. He caught himself, he says, giving a little involuntary shudder at a painful thought, and distinctly perceived that his platysma contracted. One of his sons while getting out of bed shuddered from the cold and felt this muscle contract. Mr Darwin, therefore, concluded that “ as it certainly often contracts during a shudder; and as a shudder or shiver often accompanies the first sensation of fear we have a clue to its action in the latter case ” (xcv, p. 303).

In the accounts of the frightful colliery explosion at Barnsley in 1866, the effects of fear and suspense are well portrayed. The cage was lowered into the pit in the hope of rescuing some of the sufferers. Then two men lay with their heads over the edge of the pit mouth, the spectators standing around and maintaining the most profound silence, life or death hanging on the result of the experiment. The *stillness of death* was preserved by

* *Muscle de frayeur* of Duchenne (xcvi, ‘Album Légende,’ xi.)

the awe-struck occupants of the platform, as they *checked their breath* under the influence of their highly-wrought feelings. Then the two men gave a loud shout, which was heard echoing and re-echoing within the shaft. All listened *in sickening suspense* for a response, but none came, and the shout was repeated with a like result.

In 'Childe Harold' is well expressed the signs of this condition of mind—

“ All heaven and earth are still, though not in sleep,
But *breathless* as we grow, when feeling most,
And *silent* as we stand in thoughts too deep :—”

Fear, if it does not proceed so far in the direction of terror as to paralyse the muscles, induces rapid muscular action in the form of flight, while it fixes and contracts other parts of the body in the instinctive attempt to conceal and, as it were, diminish their size. The man flying from pursuit with his head bent between his shoulders, has been justly compared to a dog with its tail between its legs, under similar circumstances. By acting chiefly on the flexor muscles, fear causes the general bending or curving of the frame—analagous to the action of the hedgehog, &c.—while courage contracts the extensors, and produces expansion and height.

“To have,” says Mr Spencer (x, i, p. 483), “in a slight degree such psychical states as accompany the reception of wounds, and are experienced during flight, is to be in a state of what we call Fear. . . . Fear when strong, expresses itself in cries, in efforts to escape, in palpitations, in tremblings ; and these are just the manifestations that go along with an actual suffering of the evil feared.”

“ He answered nought at all : but adding new
 Feare to his amazement, staring wyde
 With stony eyes and hartlesse hollow hew,
 Astonisht stood, as one that had aspyde
 Infernall furies with their chaines untyde.
 Him yett againe, and yett againe, bespake
 The gentle knight ; who nought to him replyde ;
 But trembling every joynt, did inly quake,
 And foltring tongue at last these words seemed forth to shake.”

THE FAERIE QUEENE.

The muscular states alike of contraction (or tension) and relaxation, find illustration in the emotion of **Terror**, for with the signs of the former already mentioned, and “the stare of the eye,” are combined the relaxation of the masseters, the sphincters, and the processes of organic life with which we are not now concerned.*

Beattie has accurately described the muscular action and appearance of the eyes in one form of fear—**Suspicion** :

“ Suspicion hides her head,
 Nor dares th’ obliquely gleaming eye-ball raise.”

The attitude of the muscles in **Courage**, firm and resisting, and prepared for defence, with a bold facial expression, contrasts with the well-recognised outward signs of Fear.

The influence of the conflicting mental conditions of courage, or perhaps, rather defiance, and of fear, was well represented recently at the execution of Hinson, at Newgate. I abbreviate the description given by the ‘Daily Telegraph :’—“A tall, muscular, and somewhat defiant-

* See a good description of the physical aspect of **Terror** and of other emotions in Bain’s ‘Emotions and the Will.’

looking man, *advanced with quick, firm tread* up the steps of the scaffold. He was determined to meet his fate, if possible unflinchingly. He exclaimed, 'Now for the grand secret !' and when he reached the drop, he looked with assumed nonchalance on the iron chain depending from the crossbeam above him, and then down at his feet, with which he appeared almost to stamp upon the drop. His whole aspect for a moment was that of a man who held in supreme contempt the fall that was before him, and was as ready to die as he would have been to live, had the opportunity of a renewed period of existence been afforded him. But as Calcraft, who had followed the culprit to the drop, proceeding with his hideous preparations, drew the white cap over the condemned man's face, every particle of courage seemed to forsake him ; his *whole frame quivered with fear* as the noose was adjusted round his neck ; and the chaplain, speaking the last words of spiritual exhortation left him to meet his doom. Some resistance on the part of the culprit had been anticipated, and from his demeanour when he first left the room where he was pinioned, probably not without reason. But, as previously stated, his whole bearing was altered in a moment when the full reality of his awful position was realised, and if the services of the two warders who stood behind him had been required, it would have been to support and not to control him."

Calmness—a placid condition of the feelings generally—is marked by a gentle contraction of the muscles, indicative of repose, but at the same time of latent power—by a countenance free from furrows, but not relaxed by weakness.

Rage or Anger contracts the masseters, inflates the nostrils, expands the chest, furrows the forehead, and exposes and rolls the eyeballs, clenches the fist, and induces a violent action and more or less rigidity of the muscles generally; it usually impels the body forward, while Fear impels it backward. The zygomatic muscles and levatores labii contract, and expose the teeth.

I one day saw two cabmen quarrelling in the street, one violently gesticulating while the countenance of the other (and older man) was completely controlled, and he held his hands behind him. On placing myself in a position where I could see them, I found they were in vigorous action. The overflow of nerve-force found vent there while the man commanded his features in order as he supposed to conceal his anger.

Darwin attributes the most striking signs of Rage to a *direct* action of the excited sensorium. But he observes that animals and their progenitors have when attacked fought and defended themselves, which they would not have done unless enraged. The muscular action thus associated with rage is inherited. Further, various organs will be affected by rage in nearly the same way as by bodily suffering. The heart according to him is affected in a direct manner, probably also by habit; voluntary exertion increases its action; nerve-force readily flows through accustomed channels, and thus although there may not be any muscular action whatever, the effect of the emotion of rage will be to increase the flow of nervous force to this organ, and the Will cannot control it if it would (xcv, p. 75).

"The destructive passion is shown," observes Spencer,

"in a general tension of the muscular system, in gnashing of teeth, and protrusion of the claws, in dilated eyes and nostrils, in growls ; and these are weak forms of the actions that accompany the killing of prey. Everyone can testify that the psychical state called Anger consists of mental representations of the actions and impressions which would occur while inflicting some kind of pain" (x, p. 483).

The description of Earl Doorm, who "took his russet beard between his teeth" in his anger, admirably represents the symbolic acts of this passion, as well as the accompanying rapid movements :—

"At this he turned all red, and paced his hall ;
Now gnaw'd his under, now his upper lip."

Indignation.—This state and Anger differ, as Darwin observes, only in degree from Rage. "The respiration is a little hurried ; and as all the muscles serving for this function act in association, the wings of the nostril are somewhat raised to allow of a free in-draught of air, and this is a highly characteristic sign of indignation. The mouth is commonly compressed, and there is almost always a frown on the brow, instead of the frantic gestures of extreme rage. An indignant man unconsciously throws himself into an attitude ready for attacking or striking his enemy, whom he will perhaps scan from head to foot in defiance. He carries his head erect, with his chest well expanded, and the feet planted on the ground. He holds his arms in various positions, with one or both elbows squared or with the arms rigidly suspended by his sides. With Europeans the fists are commonly clenched" (xcv, p. 246-7).

Love and **Hate** present their opposite characteristics no less clearly ; the general effect of the former on the body being to possess, retain, and embrace the object upon which it expends itself ; the attitude of the mother pressing the child to her breast being in unison with the leading feeling. The smile of **Hate** may be opposed to that of **Love**, for we may witness, especially when a person thinks he is able to succeed in a nefarious scheme,

“The ghastly smile of fell Malignity.”

Contrast again the expression of **Adoration**, a compound of love, wonder, and fear, with that of **Revenge** ; taking, on the one hand, the exquisite description of **Una**—

“ With folded hands, and knees full lowly bent,
All night she watcht.”

Or **Wordsworth's** lines :

“ Quiet as a nun,
Breathless with adoration.”

And on the other, **Collins' stanza** :

“ ——— but, with a frown,
Revenge impatient rose :
He threw his blood-stain'd sword in thunder down,
And, with a withering look,
The war-denouncing trumpet took,
And blew a blast so loud and dread,
Were ne'er prophetic sounds so full of woe ;
And ever and anon he beat
The doubling drum with furious heat.
And though sometimes, each dreary pause between,
Dejected Pity at his side
Her soul-subduing voice applied,
Yet still he kept his wild unalter'd mien,
While each strain'd ball of sight seem'd bursting from his head.”

From these examples, it is sufficiently clear that certain feelings of the mind act upon certain muscles of the body in preference to others. Taking those of the eyebrow alone, it is not an affair of chance that one state of mind induces contraction of the orbicularis palpebrarum and the pyramidalis nasi, and thereby a lowering expression; another (joy or inquisitiveness) contraction of the frontal muscle, and consequently an arched eyebrow; and a third (agony or painful thinking) contraction of the corrugator supercilii.* The fixed relationship between certain muscles and certain mental states is also proved, conversely, by the effects produced in evoking the latter, by placing the former in particular attitudes. This can be done to some extent in an ordinary condition of the system, but can only be thoroughly effected in artificial somnambulism or Braidism.

To determine the exact relation between particular emotions and particular muscles, there are three methods available. The first is to observe the contraction of the muscles under the influence of well recognised emotions, whether in the sane or insane; the second, to call up distinct feelings when the peculiar condition of the nervous system, known as artificial somnambulism, has been induced, and then to note the action of the muscles; the third, to galvanise the muscles separately and observe the mental expression produced.

The opinions universally held in regard to the expression of the emotions are based on the first method; when we speak of universal opinion, however, we are aware how

* See these various expressions illustrated in the plates of Bell's 'Anatomy of Expression.'

considerable is its divergence in regard to the significance of certain expressions. This is remarkably shown by asking different persons to give their opinion as to the meaning of certain facial expressions. Still a substantial unanimity obtains. The observation of the insane is a fruitful source of knowledge, and I have during the last ten years obtained a large number of photographs from various institutions, more especially the Cambridge Asylum, Earlswood, Essex Hall, and Bethlem Hospital. I am particularly indebted to Dr Savage for a valuable series of photographs of patients, taken at the last mentioned asylum. I have, of course, availed myself of the opportunity of observing the expressions of patients themselves in a variety of mental states, and this in many instances is more trustworthy than photographs, because the attention of the patient is in the latter often arrested and diverted into a fresh channel of thought.

It is in artificial somnambulism that I have witnessed the most beautiful emotional expressions. The effects produced on the muscles are, under these conditions, more reliable perhaps, than under any other, for the subject's mind is so absorbed in the one idea or feeling evoked, that the muscular contractions are of the most definite and striking character.

The last method referred to is that carried out with so much skill and perseverance by Duchenne (de Boulogne). It must not be forgotten that it is open to one objection from which the preceding is free. For the expressional significance of the contraction of a particular muscle must be interpreted. And this interpretation must depend upon the judgment already formed of the expression of

the emotions. What Duchenne's method serves to show is the function of each facial muscle in producing or assisting to produce a certain emotional expression, the meaning of which is acknowledged by mankind. Duchenne also induced persons to call their facial muscles into action by trying to throw themselves into certain mental states and comparing the results with the converse method of galvanising the muscles. The influence of the emotions on the muscles of the face is shown in the following table, the results arrived at by Duchenne appearing to me to be essentially in accordance with those reached by the other methods of investigation.

| | |
|------------------------------|--|
| Joy | Moderate contraction of the zygomaticus major and the orbicularis palpebrarum (inferior portion). |
| False joy; fictitious smile. | } Zygomaticus major only. |
| Agreeable reflection | |
| Laughter | Orbicularis palpebrarum (superior portion) and Zygomaticus major. |
| Laughter (ironical) | Zygomaticus major and orbicularis palpebrarum. |
| Grief. Despair . . | Buccinator. Depressor labii inferioris (quadratus menti). |
| Dejection | Depressor anguli oris (triangularis). The corrugator supercilii (<i>the grief muscle, par excellence</i>). |
| Sad reflection . . | Depressor anguli oris. Triangularis (compressor) nasi. Inferior rectus (causing downward gaze). |
| | Orbicularis palpebrarum (superior |

| | |
|-------------------------------------|---|
| | portion). Depressor anguli oris (triangularis). |
| Great grief (with weeping) | Corrugator supercilii. Zygomaticus minor. |
| Fear | Frontal portion of occipito-frontalis and platysma myoides. |
| Fright | Extreme contraction of frontalis and platysma myoides. |
| Fright (with torture) | Corrugator supercilii. Platysma myoides, and depressors of lower jaw. |
| Anger (concentrated) | Orbicularis palpebrarum (superior portion) ; Masseters ; Buccinator ; depressor labii inferioris ; platysma myoides. |
| Anger (ferocious). Rage. | Pyramidalis nasi ; platysma myoides ; depressors of the lower jaw, in an extreme degree. |
| Contempt | Palpebral muscles ; depressor labii inferioris ; compressor naris ; levator labii superioris alæque nasi. Occipito-frontalis (frontal portion) ; depressors of lower jaw. |
| Doubt. | Levator labii inferioris ; eccentric fibres of the orbicularis labii, either of its lower half or both halves at once ; the frontal. |
| Ecstasy | Zygomaticus major ; rectus superior, and obliquus superior. |
| Surprise. Astonishment. | Occipito-frontalis (frontal portion). Depressors of lower jaw. Stronger contraction in astonishment. |

(Non-emotional).

- Attention . . . Occipito-frontalis (frontal portion).
 Reflection . . . Moderate contraction of the orbicularis palpebrarum (superior portion).
 Meditation . . . Strong contraction of ditto.

In violent Passion, the dilators of the nostril come into play ; and in some forms of Fury, the masseters.

We have referred to the significant character of the movements of the hand. A very remarkable writer of the 17th century, John Bulwer, was the author of a book entitled 'Chirologia ; or, the Natural Language of the Hand ! Composed of the Speaking motions and Discoursing Gestures thereof,' &c., the motto being "*Manis membrum hominis loquacissimum.*" In it he observes that this member, which he quaintly terms "the manual Text of utterance," takes "oftentimes the thoughts from the forestalled tongue, making a more quick dispatch by gesture ; so when the fancy hath over wrought upon the Hand, our conceptions are display'd and utter'd in the very movement of a thought. For the gesture of the hand many times gives a hint of our intention, and speaks out a good part of our meaning, before our words, which accompany or follow it, can put themselves into a vocal posture to be understood. And as in the report of a Piece, the eye being the nimbler sense discernes the discharge before any intelligence by conduct of the vocall wave arrive at the Eare, although the flash and report are twins born at the instant of the Pieces going off, so although Speech and Gesture are conceived together in the minde,

yet the Hand first appearing in the delivery, anticipates the tongue, in so much as many times the tongue, perceiving herself forestall'd, spares itself a labour, to prevent a needless tautologie." The remarks on gestures in general are admirable. "The lineaments of the body doe disclose the disposition and inclination of the minde in generall; but the motions doe not only so, but doe further disclose the present humour and state of the minde and will, for as the tongue speaketh to the eare, so *Gesture* speaketh to the eye, and therefore a number of such persons whose eyes doe dwell upon the faces and fashions of men, do well know the advantage of this observation, as being most part of their ability; neither can it bee denied but that it is a great discoverer of dissimulation and great direction of businesse. For, after one manner almost we clappe our hands in joy, wring them in sorrow, advance them in prayer and admiration; shake our head in disdaine, wrinkle our forehead in dislike, criske our nose in anger, blush in shame, and so for the most part of the most subtile motions" (civ).

Bulwer, in his work, 'Philocophus; or, the Deafe and Dumbe Man's Friend,' unfolds "the subtile art which may enable one with an observant *Eie*, to *heare* what any man speaks by the movement of his lips,"* and designates Gesture the *Vox Corporis*—the only speech and general language of Human nature. "What though," he says, "you cannot expresse your mindes in those verball contrivances of man's invention; yet you want not speech. who have your *whole body* for a Tongue, having a language

* A very early reference to lip-language, now so much employed in the education of deaf mutes.

more naturall and significant, which is common to you with us, to wit, Gesture, the general and universall language of Human Nature, which, when we would have our speech to have life and efficacy, wee joyne in commission with our wordes, and when wee would speak with most state and gravity, we renounce words and use *Nods* and other naturall signes alone" (cv, *Introduction*).

We may undoubtedly grant to Bulwer what, he says, is all he asks to be allowed—"to have bin the first that by Art endeavoured to linke the Muscles and the Affections together in a new Patho-myogamia; or at least to have published the Banes between *Myologus* and *Pathology*, that any Physiologicall Handfaster that can marry them stronger together might doe it if he pleas'd" (cvi, *Introduction*).

Taking a general view of the opposite conditions of the muscles—contraction and relaxation—it may be observed that the absence of all painful and pleasurable emotions—a state of apathy—may be accompanied by motionless features and relaxed limbs; but perhaps the simplest and most satisfactory illustration of Emotion producing relaxation of the voluntary muscles is found in moderately pleasurable states of the mind. The whole body is in a languid and relaxed condition, and naturally assumes the recumbent posture; the eyelids droop, and the lips slightly open. If the emotion intensifies into active Joy, smiling and laughter succeed, in which the fibres of the orbicularis oris are relaxed. We have, however, no longer simple relaxation, but decided contraction also, the antagonistic muscles of the orbicularis—the zygomatici—being called

into active exercise. Relaxation, again, we have seen exemplified in the later stages of Grief, in which it results from the exhaustion of pain and despair. In weeping, in which there appears to be a relaxation of the muscular fibres surrounding and controlling the mouth, the effort is really due to the powerful contraction of the muscles of the cheek, and especially of the *triangularis oris*.

Contraction, it has been said, is the natural language of the painful emotions, relaxation of the pleasurable ones, and it is true that in the early stage of Grief we witness violent contractions of some of the muscles. In Anger, again, the muscles are vigorously contracted ; but there are many exceptions to the rule as thus laid down. It would be more correct to say that the pleasurable or joyous emotions impart *expansion* to the *expression* ; the painful or sorrowful ones, *concentration*. Some confusion has arisen from the use of the word "contraction" as applied sometimes to the muscles, and sometimes to the expression. Joy, Hope, Benevolence, contract the muscles ; so do Grief, Fear, Avarice ; but the former mainly contract the extensors, and the latter the flexors, and the result in the first case is expansion. However, we shall subsequently see more clearly how far, and in what sense it is true that there exists a relation between contraction and painful emotion on the one hand, and relaxation and pleasurable emotion on the other.

What principle determines these outward manifestations ?

The discussion of this question has been to some extent anticipated, as the origin of certain facial movements has been suggested in enumerating them.

We must commence with the recognition of the fundamental principle which governs purely corporeal actions, before we can trace the guiding principle of emotional movements.

Prochaska did this under the term *Lex Nostræ conservatio* so prominently brought into notice as a grand teleological law by Professor Laycock, and by Bain as the law of self-conservation. By virtue of it, in unconscious states, certain movements take place to ensure the preservation of the individual. In conscious states the working of this law is mainly secured by feeling—by the sensations of pleasure and pain.

The emotional movements are no less guided by the same principle, and they employ the same machinery when outwardly expressed.

Some of these movements, however, are obviously directly designed to secure, in accordance with the law of Conservation, the object suggested by a certain emotion, while others have no such direct object, but occur by virtue of a law of Correspondence, to which we are about to refer. The former may be called primary; the latter, secondary or figurative.

Under the influence of Fear, or a sense of danger, certain muscular movements, securing flight or defence, occur, the obvious utility and design of which we at once recognise. Apart from expression, although from their constant association with certain feelings, they become recognised as indications of the latter, and as such, are of use. They may or may not be combined with the Will. They are in some instances, as in the action of Grief on the lachrymal glands, safety valves—mainly outlets of

emotional excitement—though not the less useful as constituting a part of the natural language of the emotions. There are, moreover, a number of movements which have more or less lost their primary character and are not now, in the same sense, immediately employed to protect the individual, but are mainly important as outward signs of emotion. These muscular changes appear to be based on those originally performed for the service of the bodily organs, and especially those which minister to sensation.

Gall, who, in spite of the fate of the details of his Organology, was an original observer, a true philosopher, and infinitely superior to most of his critics, made an honest, though unsuccessful endeavour to account for the character of the movements accompanying the different emotions; and his descriptions of their natural language, independently of his mode of explaining them, have rarely been surpassed. In some of the best-marked examples, the pose and movements of the head are in accordance with the alleged position of the cerebral organs, but this, granting the correspondence, would only explain a part of the movements of the muscles of the face and body; and further, there are emotions characterised by marked outward signs, none of which appear to receive any explanation from their supposed seat in the brain. Thus, the movements of Anger are not explained by the situation of Destructiveness above the ear, although Gall attributes to this the fact that "the head is drawn between the shoulders, and is carried neither forward nor backward, but makes a rapid movement, or rather it turns rapidly from left to right, and from right to left." With

regard also to the action of the teeth, &c., in Anger, such movements are much more easily explained on the principle that the muscles prefigure the form which they would assume in the corporeal acts of eating &c., and which we witness in carnivorous animals when, under the influence of rage, they tear their prey. The pantomime in man is in such instances a figure of the real and completed act in animals. "Why," asks Gall, "does the humble man walk meekly along, with his eyes fixed on the ground, while the proud one struts with expanded chest and head erect?" And his answer is that, as "the organ of Pride has its seat in the median line, in the superior posterior part of the head; during its energetic action it elevates the head and carries it a little backward;" while, as Humility is the reverse state, the head and body are bent forward. "It can only be explained by the absolute inaction and the complete apathy of the organ of Pride" (xxii, v. p. 282). This example is the most plausible that can be adduced in favour of Gall's position. It does not, however, help to explain many of the gestures which we observe in Pride, and which we refer to another principle. As regards the elevation of the head might it not be accounted for by the corresponding attitude assumed when a person on a height has literally to look down from it upon one who is below him; or when a giant regards a dwarf? Hence a proud man is said to be "high," and he is apt to utter tall talk. In the opposite state of Humility, may not the position of the head be explained by a reference to the counterpart form assumed in bodily debility?

Sir Charles Bell, in that fascinating book, 'The

Anatomy and Philosophy of Expression, as connected with the Fine Arts,' divided the cerebro-spinal nerves into two great classes: the first, or original, comprising those of the Cord and the Fifth Cerebral Nerve, possessed in common by man and the lower animals; the second, the far-famed "Respiratory" or "Superadded" class, introduced to adapt the organ of breathing to man's intellectual nature, arising from the medulla oblongata and supplying the head, neck, throat, and chest, which thus form "a mechanism for Respiration not found in the lower animals, but gradually introduced by a slow process of development into the animal kingdom, in order that, besides oxygenating the blood, it may be, in Man, the organ of Voice and Expression." This class of nerves it is which is mainly affected by the emotions; in fact, their office, according to Bell, is to communicate our feelings, "not in the language of sounds merely but in the language of Expression in the countenance also." But the action of the mind on the heart is anterior to that on the lungs. Thus, he says, "Certain strong feelings produce a disturbed condition of the heart; and through that corporeal influence, *directly* from the heart, *indirectly* from the mind, the extensive apparatus constituting the organ of breathing is put in motion, and gives us the outward signs which we call Expression" (cvii, pp. 87, 92, 267).

That the emotions act upon the muscles concerned in expression, through their primary influence upon the heart and respiration, as insisted upon by Sir Charles Bell, can only be admitted up to a certain point, and unless qualified and supplemented, serves to explain the *modus operandi* of

only some of the expressions occasioned by emotional excitement.*

"There is," he observes, in his graphic description of the effects of Terror on man, a "spasm on his breast—he cannot breathe freely; the chest is elevated; the muscles of his neck and shoulders are in action; his

* Darwin, who in his introduction to his 'Descent of Man,' says that he had intended including in his work an essay on the expression of the various emotions of man and the lower animals, adds that his attention was called to the subject by Sir Charles Bell's book on the 'Anatomy of Expression,' in which he "maintains that man is endowed with certain muscles solely for the sake of expressing his emotions." On this Mr. Darwin observes, "As this view is obviously opposed to the belief that man is descended from some other form, it was necessary for me to consider it. I likewise wished to ascertain how far the emotions are expressed in the same manner by the different races of man." On these two questions, the mass of facts Mr. Darwin is likely to collect together will be of great interest [1872].

I retain this footnote, written before the publication of Mr Darwin's remarkable book, "The Expression of the Emotions in Man and Animals," which fulfilled the expectation raised by the previous writings from the same original observer.

I may be allowed to add Darwin's words in sending me a copy of his work:—"I have now finished your book, and have read it with great interest. Many of your cases are very striking. As I felt sure would be the case, I have learnt much by it; and I should have modified several passages in my book on Expression if I had had the advantage of reading your work before my publication. I always felt, and said so a year ago to Professor Donders, that I had not sufficient knowledge of physiology to treat my subject in a proper way." (Dec. 22, 1872.) The best proof I can give that I think Darwin's modesty led him to underestimate his qualifications for the task he undertook, is to cite his conclusions freely in this edition [1883].

breathing is short and rapid ; there is a gasping and a convulsive motion of his lips, a tremor on his hollow cheek, a gulping and catching of his throat ; and why does his heart knock at his ribs, while yet there is no force of circulation ?—for his lips and cheeks are ashy pale” (cvii).

So in describing the overwhelming influence of Grief on woman, he speaks first of the nerveless and relaxed condition of the body—it reclines ; the limbs gravitate. Then follow the signs connected with respiration. “ Why comes at intervals the long-drawn sigh ? Why are the neck and throat convulsed ? What causes the swelling and quivering of the lips, and the deadly paleness of the face ? or why is the hand so pale and earthly cold ? and why, at intervals, as the agony returns, does the convulsion spread over the frame like a paroxysm of suffocation ?” Bell’s answer is that these outward signs of the passions in the face and elsewhere cannot proceed from the direct influence of the mind. “ However strange it may seem to unaccustomed ears, it is to the heart and lungs, and all the extended instruments of breathing, that we are to trace these effects.”

With the required modification of the *theory* laid down, the force and truth of these *observations* may be readily admitted. It is impossible not to see in the oppression of the breathing, and in the expression of the muscles of the face most concerned in respiration, the same effects produced by certain violent mental emotions, which are the result of morbid conditions of the heart and lungs without these mental changes. It seems clear, indeed, as we have said, that the encephalic centre of the emotions

must be closely connected with the roots of the nerves supplying the lungs ; so that, by a fixed physiological law, secured by connections—not mere contiguity—of nervous fibre, it is almost impossible for the former to be excited without increasing the action of the thoracic organs. But there would seem to be something more than all this—a certain fitness, discernible in many instances, at least, and probably present in all, between the emotion which agitates the muscles of even the mouth and nostrils, and the form which they assume, and which may be due to the action of another and more comprehensive principle.

Bell does not explain why of two equally powerful emotions, one induces a happy, the other a miserable expression of the features, although, in both instances, the heart beats loudly against the walls of the chest, and the breathing is equally accelerated. The palpitation of joy and fear, the breathlessness of delight and alarm, are accompanied by opposite facial expressions. Another principle is at work.

This principle rests first upon the fact that the functions of the bodily organs are assisted and guarded from injury by, and, in short, are dependent upon, the action of the muscles. In regarding the action of the emotions, therefore, upon the muscles, it seems natural to trace their movements to their original use and signification in their immediate connection with the bodily organs, particularly those of special sense.*

The assistance rendered by the muscles to the bodily organs, and which is effected both by the will and auto-

* See footnote at p. 83 of this work.

matically, may be illustrated by their action on the organs of sense.

For example, in ordinary vision the facial muscles, including even those of the eyeball, may be passive, but the moment it is necessary to look intently at an object, they are employed to direct the organ of sight towards it, and exclude impressions from other sources. In addition to the direct action of the muscles of the eye, those of the cheek are raised, and the eyebrows are depressed. More than this, there are accordant or sympathetic gestures of the body. To this class of movements we shall refer under a distinct head.

So, in more than ordinary smelling, the *alæ nasi* are dilated; and to escape a disagreeable odour, the nasal muscles conspire to exclude it.

In listening, again, while the trunk is fixed, the neck is strained in order that the ear may approach nearer to the point whence the sound proceeds, and all the facial muscles assume a significant form, having relation to the organ of hearing.

In tasting, the action of the lips assists in bringing the food in contact with the most sensitive portion of the tongue, and according as it is pleasant or nauseous, they assume different forms. With tasting are closely connected the acts of deglutition, mastication, and respiration, the muscular signs of which are familiar to all.

These muscular actions called forth by impressions from without, and so helping to bring us into relation with the external world, are not, however, confined in their exercise to this directly sensational sphere, but are constantly employed *by the emotions*—and in intellectual

operations, as we have seen—being then excited by impressions from within. These emotional movements may, as we have said, be called figurative. Thus, there exists a beautiful correspondence between the play of the muscles from the action of the senses, and from the action of the sentiments. Observe in *Pride*, understood in its coarser form, how much of the outward exhibition of its natural language is associated with the normal action of the muscles when employed in the exercise of bodily functions for wholly different purposes. The muscles connected with the eye no longer direct the attention to other men, or to surrounding objects, for it is exclusively directed to *self*; the nostrils dilate, not as respiratories, but, as it were, “to smell some ideal perfume; and the mouth performs the movements of pleasurable deglutition” (Gratiolet). Indeed he tastes himself. Here, then, we have the muscles of the eye, the nose, and the mouth, as organs of sight, smelling, and taste, affected by non-sensational, or purely mental excipients. The mouth is also affected as an organ of respiration; there is a slight smile of satisfaction, but at the same time somewhat repellent. The expression of Sadness presents a striking contrast, for it is a state, in fact, of disgust, instead of one of infinite satisfaction, in tasting self. Instead of the saliva being swallowed, it is allowed to escape from the mouth, the tendency, now being for the lips to open, and the gullet to close; moral disgust is marked by physical dis-gustation. Gratiolet asks—“Ne dit-on pas à chaque instant que la tristesse amène le dégoût de la vie?”

An enraged man mentally tears his foe in pieces. And

is not this emotion clearly reflected in his voice? Sometimes the hated name of Tarquin was pronounced plainly by the maddened Collatinus—

“ But through his teeth, *as if the name he tore.*”

The same principle applies to the actions or gestures of the whole body. Dislike and affection, mental pleasure and pain, occasion general muscular movements similar to those which arise from corresponding bodily states. If the mind repels a suggestion, the attitude assumes the form of resistance; if it hugs a pleasant thought, or embraces a beloved image, every action is in accordance therewith. This manifest action of the law is very noticable in intellectual operations, and has already been referred to when we spoke of the influence of the Intellect on the muscles.

Thus, the mind acts figuratively through all the muscles of the body, the limbs, the trunk, and the face; but it so happens that the great group of movements classed under the head of “ Expression ” are mainly those of respiration, and hence the muscles of respiration may be regarded from Sir Charles Bell’s point of view as emphatically, though by no means exclusively, those of expression also. But the facial nerve, although employed in respiration, is also employed for movements connected with the external senses; and these sensorial movements are also excited by what may be regarded as analogous or corresponding mental states, and, moreover, some of these are effected by muscles not supplied by nerves included by Bell in his respiratory class. In short, while it is quite true that the emotions affect the respiration, while the

lungs and heart are most truly organs of expression, and while the facial muscles are unquestionably affected in their character of respiratory muscles, by emotional excitement, they are also affected by this cause *as muscles of sense*; and all these movements, whether of the respiratory or the sensorial class, assume, in certain states of the emotions or feelings, the same forms as they would if subjected to corporeal impressions, affecting the respiration and the senses respectively. That we can always trace the correspondence, and say this mental expression represents and symbolises what would have occurred under such and such physical conditions is not affirmed, but that we very frequently can do so, is certain, and that the same law pervades the whole class of emotional movements to which we refer, is extremely probable.

Reverting now to the observation previously made, that the outward signs of pleasurable and painful emotions cannot be easily indicated by any word uniformly descriptive of their presence—by “relaxation and contraction” of the muscles, or even by “expansion and concentration of the expression”—it must here be remarked that the influence of these feelings is all-important from the present point of view. Combined with the principle of figurative movements, which serves to explain why one set of muscles is called into action rather than another, it becomes true that the form assumed by the features under various emotions is determined by their character, whether painful or pleasurable, just as the muscles of sense are determined by the character of sensorial impressions. As all movements have for their great end the preservation as well as the enjoyment of the individual, and as con-

traction and relaxation take place primarily to attain this end, a general expansiveness of expression and gesture is allied with all the emotions which are excited by impressions (or generated by ideas) of a beneficent character, while a general exclusiveness or contraction of the features is allied with emotions excited by maleficent impressions, the object of one class of movements being to court and receive, and of the other to avoid and reject.

As pleasurable vision causes one expression of the eye and its surrounding muscles, and painful vision another and opposite one of these parts, and so of all the other senses, respiration, deglutition, &c., so pleasurable and painful emotions, in affecting the muscles connected with this or that sense, will cause them to assume the form proper to their own sensibility.

Frequently an emotion excites all the sensorial and respiratory muscles; at other times the influence is distinctly partial and circumscribed, the muscles of one sense only being called into mental activity. In the original form of the features in their relation to the exercise of the sensorial and respiratory functions, we have traced the sentinel-action of the muscles subserving these functions, admitting or excluding impressions, according as they are beneficial or noxious, pleasurable or painful. If a stream of light is painful to the eye, all the muscles concerned unite in excluding it and protecting the sight; if agreeable and salutary, they combine to favour its entrance.

The parallelism on which we insist remains unaffected, whether we adopt the hypothesis of the sensationists or the conservationists. Indeed, it is admitted that the law

of conservation is usually secured by, and is ever in accordance with, a system of pains and penalties. It may be by virtue of a primary conservative reflex law that we close our eyes to a strong light, but the pain we endure by continuing to gaze at it soon obliges us to do the same thing. In either case, or whichever explanation be given the muscles connected with the organ of sight unite in protecting it and excluding the light; and analogous mental states induce the same changes. In fact Professor Laycock, the most able and uncompromising advocate of the *Lex Nostræ conservatio*, fully admits that in states of consciousness, conservation is usually secured by feeling. Thus, after observing that as a feeling of pleasure or pain is very often associated with the action of the conservative machinery, the inference is unjustly drawn that feeling is the cause, he says, "Pain is the sentinel of the organism," which "ushers in or accompanies a series of vital changes, the end of which is the prevention of evil, or the restoration of health from illness" (lv, ii, pp. 27, 35).

Pleasurable and painful sensations from without determine, then, the form which the muscles called into action assume; the purpose being to protect the organs. Similar muscular changes arise from the emotions, according as they are pleasurable or painful, in consequence of the harmony between mental and bodily acts. The mind figuratively speaking, sees, hears, smells, tastes, touches, and respires, and with each of these mental operations the feeling of pleasure or pain may be associated and affect the muscles accordingly. The emotions may eagerly receive or forcibly reject the stimuli which excite

them. In regard to the action of the respiratory muscles, it is necessary to supplement the excitement they undergo through the action of the emotions upon the heart and lungs as laid down by Bell, by the principle under consideration. The form which the muscles of the mouth assume (regarding it here as an organ of respiration) in laborious breathing, is designed to assist it, and when certain emotions arise, the same expression of these muscles presents itself. What before was a mechanical act in aid of respiration becomes the natural language of the breathings of the soul. The pleasurable emotion which causes a smile relaxes the mouth, inducing an expression which corresponds with that excited by the respiration of pure air. Joy accelerates the action of the heart and the circulation; the respiration is quickened, and the muscles of the mouth tell the tale, while laughter is effected by a convulsive form of respiration. On the other hand Fear takes away the breath, and produces on the facial muscles the character impressed by dyspnœa from pulmonary obstruction.

By way of summary, it may be said: We suffer pain of two kinds—bodily, as toothache; mental, as grief or anxiety; and when the latter occurs, the outward signs, allowing for local differences, are the same as those which are exhibited in the former. Hence, when Joy, and Fear respectively cause respiratory and cardiac excitement, the expression of the features is entirely different—the form assumed being determined by the corresponding bodily form excited by common and special sensation—the rough outline of general expression representing common sensation, and the delicately specific shades answer-

ing to the predominating special sense figuratively affected.

It cannot, in short, be too strongly insisted upon in connection with this subject, and particularly in reference to Sir Charles Bell's doctrine, that the same facial muscles perform different functions, and that therefore the so-called respiratory nerves supply muscles which are used not only in respiration. Take (*e.g.*) those connected with the mouth. They are not merely muscles of respiration—but also of taste, and prehension. So far as they are respiratory in character, they will be influenced by acts of respiration, and hence whatever emotion disturbs the action of the lungs may affect the muscles of the mouth. But mental states may act directly on the mouth in its other functions, and without exciting the action of either the heart or lungs.

The respiratory muscles, again, may be excited by an emotion, and two very different emotional states may to this extent have a common effect; but the particular form the facial muscles assume, may be completely modified by the figurative expression which the muscles assume in accordance with the character of the emotion—especially whether painful or pleasurable.

I have reserved to this point a statement of the fundamental principles laid down by Darwin. They are by no means inconsistent with those which I have already maintained. There are according to him three great principles of expression; *first*, that of *serviceable associated habits*. Certain actions are of service under certain states of mind in order to relieve or gratify certain sensations or desires, and whenever the same state of mind is induced,

however feebly, there is a tendency through the force of habit and association for the same movements to be performed, though not then of the slightest use. The Will can repress some of these, but the muscles least under its power will still act and cause movements recognised as expressive. In other instances, slight movements, also expressive, are required to check one habitual movement. *Second*, the principle of *Antithesis*. When an opposite state of mind is induced, there is an involuntary tendency to perform movements of a directly opposite nature, although of no use whatever, and these are also very expressive. *Third*, the principle of actions due to *the constitution of the Nervous System independently from the first of the Will, and independently to a certain extent of Habit*. In short, *the direct action of the nervous system* (xcv, p. 29).

Darwin applies his leading principle of associated habit to the influence of emotion on the voice, which, he says, "from having been habitually employed as a serviceable aid under certain conditions, inducing pleasure, pain, rage, &c., is commonly used whenever the same sensations or emotions are excited under quite different conditions, or in a lesser degree" (xcv, p. 84).

In the first instance, the excitement of the sensorium through emotion would strongly excite the muscles generally, and consequently sounds would be uttered, although of no use. These purposeless contractions of the muscles of the glottis and chest "*may*" have first given rise to the emission of vocal sounds. Thus cautiously does Darwin put it. He then proceeds to refer to "the various purposes" for which the voice is now

largely used by animals, including what he regarded as "the primæval use" of the voice; the endeavours made by the male to charm or excite the female. Again, rage produces violent action of all the muscles, including those of the voice. Animals, when in anger, "endeavour to strike terror into their enemies by its power and harshness. . . . Rival males try to excel and challenge each other by their voices, and this leads to deadly contests. Thus the use of the voice will have become associated with the emotions of anger, however it may be aroused" (xcv, p. 85).

As to the different sounds uttered under different emotions, Darwin himself confesses that the subject is "very obscure," and he did not think it probable that any precise explanation of the cause or source of each particular sound, under different states of the mind, will ever be given" (op. cit. p. 85). Nor could he explain why particular sounds give pleasure (p. 88). The musical character of the voice under the influence of some strong emotions was supposed by Darwin to be due to the progenitors of man having probably uttered musical tones before they acquired the power of articulate speech. The pitch of the voice varies, as he points out, with certain states of feeling, as we witness in the high-pitched voice of a person complaining of ill-treatment. Groans and screams, however, are alike the vocal expressions of agony, though of different kinds. On the other hand it is natural that if an animal calls for assistance the cry will be loud and long, while those designed to please the female will be sweet, and those intended to frighten the enemy will be harsh. A tremulous voice is the obvious

result of fear causing the muscles to tremble, and it becomes husky from the dryness of the throat and mouth, the well known influence of fear on the salivary glands coming into play (see xcv, pp. 91-93).

To rebut Sir Charles Bell's position that the vocal and respiratory organs are specially adapted for expression, Darwin adduces the fact that not only is there a prior and direct use for certain sounds, but that "sounds otherwise produced serve equally well for the same purpose" (xcv, p. 94). Thus there is the angry humming of bees useful as "a warning that there is a danger of being stung." Some insects make a noise by rubbing together parts of their hard integuments, which constitutes a call to the female. Storks make with their beaks a loud noise, and so on.

In the prominence which has been given to the more particularly Darwinian explanation of the expression of the emotions, the importance attached by Darwin to the direct action of the emotions on the nervous system in causing such expression has been too much overlooked. Yet there is no sufficient excuse for this, for Darwin with his accustomed fairness distinctly says "on the whole we may conclude that the principle of the direct action of the sensorium on the body, due to the constitution of the nervous system, and from the first independent of the Will, has been highly influential in determining many expressions" (p. 81). All he says, is, that emotional actions are "often combined with others which follow from our first principle, namely, that actions which have often been of direct or indirect service, under certain states of the mind, in order to gratify or relieve certain sensations, desires, &c.

are still performed under analogous circumstances through mere habit, although of no service." Darwin was also candid enough to admit that after applying his and the more usual principles to explain the effects of emotion, "very many points in the theory of Expression remain inexplicable" (xcv, p. 82).

The *language* which we employ in reference to mental acts illustrates, in a remarkable manner, the figurative character of the movements referred to under this head. Thus, as a state of mental disgust may cause an expression of the mouth similar to what is seen in threatened vomiting, so we speak of *loathing* in regard to the objects contemplated by the mind. We loathe the idea of a certain act, as much as a certain nauseous drug. Dr Chalmers, in one of his sermons, referring to some opinions from which he strongly dissented, exclaimed, "I *nauseate* them!" A lady who heard him informs me that the emphatic enunciation of the word, and the accompanying gesture, indicative of nausea, had a most striking effect. In the muscular changes originally associated with nausea and vomiting, there was an obviously direct design and physical use, altogether apart from expression; but the corresponding changes induced by emotion are merely figurative, although they became serviceable as outward signs, the uniformity of these signs constituting their utility as a natural language. No savage expresses grief by laughter, however true it may be that some of the African tribes, as described by Sir Samuel Baker, make merry at the funerals of their relations. The obvious explanation of this seeming

anomaly is that Grief is not felt, but Joy. An admirable popular illustration of the uniformity of natural language will be found in 'Greyson's Letters,' by Professor Rogers, in which the absurd effects of supposing a reversal of the fixed signs of grief are humorously described.

Illustrations of figurative language derived from figurative movements abound; but a few additional ones will be sufficient for our present purpose. A stifling smell induces muscular contractions in the nasal muscles calculated to avoid it; and a bad moral odour affecting the mind will cause a very similar expression. The corresponding language may be found in a line of 'King John,' where Shakespeare makes Salisbury say—

"For I am stifled with this smell of sin."

So again, as the motion of the lips and even deglutition may indicate that we are mentally tasting and relishing a certain pleasurable idea, we employ such language as "the mental palate," "a man of taste," and we speak of "disgusting" and "distasteful" in reference to purely subjective phenomena.

Tact is the psychical analogue of touch, but of course has infinitely wider relations than those possessed by mere tactile sensibility.

The influence of the emotions on the original formation of words may sometimes be traced with tolerable clearness. If we wish to express contempt, we say, *Pooh!* Now, it is evident that this originates in the act of throwing out the lips, so as to reject something that is distasteful. What? An idea. The gesture is precisely the

same as that which we employ in order to rid the mouth of a material substance with which we are disgusted, and is therefore figurative. In the same way we may trace the words *putidus*, *fetidus*, &c., to their roots *ptt* and *ftt*, which are the natural sounds produced by the labial movements indicative of disgust. There are also guttural sounds expressive of still greater disgust, *arrrh* and *krrrh*, which appear to be the bases of words in various languages as *cracher* in French.* Probably *ptt* is the root of our *s-pit*. The word *hiss* again is derived from the sound made in emotional states of hate and contempt. The sound is derived from the labial gesture, and the labial gesture is similar to, and figurative of the movement performed by the sudden jerking expiration employed in expulsion. We try to show our scorn by expelling a certain individual or idea from our thoughts. A reverse action is expressive of assent, and produces an inspiratory or suction sound; one, at least, very common in Cornwall.

As we have already observed, some movements are of a *sympathetic* character. In the use of the bodily organs, in addition to the action of the muscles directly required, other movements arise which are in unison with them. The whole body—the attitude and gestures—will thus sometimes display sympathy with the exercise of only one sense. “Whether one member suffer, all the mem-

* Cf. Gratiolet, *op. cit.*, p. 161. He traces to the various sounds made between the lips and the throat, *frrr*, *trrr*, *rrrr*, *grrr*, the words *φριξ*, *frigus*, *froid*, *frayeur*; *τρέμω*, *tremor*, *terreur*; *ῥίγος*, *rigor*, *roideur*, *horreur*; *gronder*. We may add our English words, *fear*, *fright*, *terror*, *horror*, *roar*, *growl*.

bers suffer with it ; or one member be honoured, all the members rejoice with it." This apparent excess of action is readily explicable as being correlated to the central disturbance, since the flow of nerve energy is directly proportionate to the causative emotion. It must not, however, be forgotten that this sympathy may be as much shown by passive as by active forms, by respectful and considerate relaxation as by jubilant contraction.

It follows that when an emotion excites any of the muscles figuratively, the other muscles will be excited sympathetically, as they would have been by the original action of the bodily organs in what we have, for the sake of distinction, termed sensational movements. In this way the contraction or relaxation of many of the muscles, consequent on emotional excitement, may be explained.

SECTION II.—Irregular and Excessive Muscular Contraction: Spasms and Convulsions.

To some extent we have anticipated the consideration of the influence of Emotion on spasmodic action of the muscles, in describing the effects produced by powerful emotional states, as Terror, which often causes excessive or spasmodic contractions, sometimes amounting to tetanic rigidity. The sobbing of Grief, the laughter of Joy, afford daily examples of spasmodic muscular contraction from emotional stimulus. The spasm which chokes the voice and converts the fibres of the platysma myoides into rigid cords in Terror, the convulsion and tremors of the facial muscles in Despair, the clenched hands, the

convulsive opening of the mouth and spasm of the diaphragm and muscles of the chest in Fear, the spasm of the jaws in Rage, the spasmodic rigidity of the muscles in a maniacal paroxysm—are they not written in the graphic pages of Bell? With the exception of mania, these illustrations of spasmodic contractions are consistent with health. We shall include under the present section all convulsive attacks, whether epileptic or not, whether infantile, puerperal, or hysterical, trembling palsy, chorea, spasms of the larynx and pharynx, nervous hydrophobia, and tetanus. Physiologically, they may all be referred, when of emotional origin, to disturbance, more or less serious, of the functions of the sensori-motor apparatus, especially the medulla oblongata.*

When the mind is affected by witnessing a frightful sight or hearing dreadful news, the impression is conveyed—a certain molecular change occurs—along the nerves of special sense to the brain, and the emotion excited agitates, through the sensori-motor centres, the muscular system. If, on the other hand, a terrific image is formed in the mind, independently of stimuli from without, the muscles are aroused to more or less violent action by the idea exciting emotions which operate upon the sensory centres and ganglia, in the same way as when they are called into action by the nerves of special sense. Whether Emotion acts in inducing abnormal and excessive action of the muscles, in a similar manner as the electric irritation of certain nervous centres induces convulsions, is a more difficult question, on which much difference of

* This is borne out by the latest researches in this portion of the nervous system, especially those of Woroschiloff [1883].

opinion still exists ; but its determination does not affect the statement just made.

Epileptic Convulsions.—Although all the forms of spasm and convulsion have the one point in common—that of involuntary, irregular action, clonic or tonic, of the voluntary muscles—we have sooner or later when Emotion occasions epilepsy, something more—loss of consciousness.

The influence of violent emotion in causing epileptic attacks will not be disputed. How this is brought about is by no means certain. On the one hand we know comparatively little of the mode of action of emotion in the healthy brain, or, on the other, of the pathology of epilepsy. It may be, that in accordance with the opinions now prevalent as to the *modus operandi* of epileptic attacks, mental shock or excitement in an unstable brain causes an “explosion” of nervous power in the cerebral cortex, which passing down the efferent nerves induces convulsions ; unconsciousness resulting, as is alleged, from the exhaustion of the cortical cells or from interference with the ordinary nerve currents by excessive discharge. Todd, Van der Kolk, and others have employed the familiar illustration of the Leyden jar. Continual malnutrition according to this view, causes disturbance of the polar state of some region of the encephalon. If amounting to a certain intensity it is manifested in an epileptic fit, as the jar, when charged “with electricity to a certain state of tension, gets rid of the disturbance of equilibrium by the disruptive discharge” (Todd’s *Lumleian Lectures*, 1849). And the Dutch physician compares the ganglionic cells to galvanic or electric batteries,

which must be charged to a certain extent before the electricity accumulated in the Leyden jar has acquired sufficient tension to discharge the flask (lvii, p. 215).

Dr Hughlings Jackson's well-known views are in accord with this position, although much more definitely worked out as to the share taken by the cortex in these discharging lesions. The true pathology of epilepsy remains, however, obscure, and we repeat, therefore, that until the physiology of emotion and the pathology of epilepsy are better understood, we must be content to confess our ignorance and to await a further advance of knowledge before we can say how emotional epilepsy is induced. The above mentioned views even though they seem to derive support from Ferrier's researches are confessedly hypothetical.

The experiments of Kussmaul and Tenner on animals, made with a view to determine the cause of convulsions, bear upon the question of vascularity. They are so well known that it is only necessary here to recall the position in which they leave the question as to the nature of epileptic and eclamptic attacks—namely, that it is probable “that epileptic convulsions can be brought about by contraction of the blood-vessels induced by the vaso-motor nerves” (xlii, p. 101).

But whatever be our surmises as to the pathology of convulsive seizures they must not be allowed to divert our attention from the more obvious truths, that the emotions when sudden or excessive in character do, by their downward influence through the medulla oblongata, produce altogether involuntary movements, convulsive in character; that these emotions may be excited from

without through the senses, or from within by ideas ; and that the convulsive movements succeeding these emotions may be epileptic. Mal-nutrition of the nervous tissues may doubtless be induced by a prolonged emotional disturbance like grief, and then the first paroxysm may be induced by other than psychical stimuli—the impaired nutrition having probably been caused by the influence of a depressing emotion on the blood, and the particular disease, epilepsy, being determined by individual predisposition.

The following case of convulsions was of emotional origin. I abridge the report of the case given by Dr Althaus in the 'Medical Times and Gazette,' April 24th, 1869.

Mary B—, æt. 16, one of fifteen children of the same mother. The mother says none of her other children have had fits, but that she had a succession of frights when *enceinte* with this child. The girl herself had her first fit after a fright, some other children having played at ghost with her in a cellar. This was when she was five years of age. Some years afterwards she had another fright, by a woman coming up to her while she was playing in the street, and swearing at her. Since this she has never been quite free from fits. The convulsive seizures are well marked, commencing with a scream ; the head is turned to one side, there is foam at the mouth, the tongue is bitten, the urine often passes involuntarily. The convulsion lasts four or five minutes, during which there is complete loss of consciousness. After the fit the patient sleeps for half an hour, and then wakes with a bad headache, and speaks slowly and thickly for some

time. There is no aura with these fits, which occur at intervals of two or three weeks. Sometimes she has a succession of five or six in the same day; at others only one or two at a time. The attacks of petit mal are much more frequent, as she has sometimes thirty or forty such seizures in one day, and rarely goes three or four days without any. Four months' treatment with bromide of potassium relieved her of the convulsions, but the petit mal remained the same. A month after this, during which galvanism was applied to both mastoid processes and the cervical sympathetic twice a week, report is made, "much better in every respect. Since galvanism was commenced she has only on three occasions had fits of petit mal, and then only four or five where she had thirty before." November 12th.—"Has had altogether ten applications of galvanism. Had last attack of petit mal early in August. Last convulsive attack March 3rd. Apparently well. Ceased attendance."

In another case, under the care of Dr. Althaus, the disorder was attributed by the patient to a great deal of trouble and anxiety, and was also preceded by a great fright when he was awakened by an alarm of the house being on fire.

When admitted into the Infirmary for Epilepsy and Paralysis he was 36, and had suffered for six years from irregular attacks of petit mal, the attacks being marked by severe pain at the back of the head, and a thrilling sensation going through him as if about to die. Sometimes it appears to him "as if a vapour rose on his brain and muddled him." This lasts only about a second, and he then quite loses his consciousness for about a minute.

While in this condition he will perhaps scratch the plate with his knife, or tear up paper or his clothes, or pull a handkerchief over his head, or, if in the street, put mud on his clothes, &c. When he comes out of these attacks he feels very confused, and sees double for two or three minutes. Within an hour or two he has quite recovered himself. These fits happen two or three times a week, generally only one in a day, and but very rarely two or three at a time. From Nov. 27th, 1866, to April 2nd, he took sulphate of zinc, cod-liver oil, and nitrate of silver, but, although the general health improved, the fits remained as frequent. Galvanization of both hemispheres and the medulla oblongata was then ordered twice a week. In the course of the next month he had only one fit, in which he tore his waistcoat, and the report of Oct. 15th says—"Has had altogether fifteen applications of galvanism and no fit during the last four months. Ceased attendance" (xlv, May 8th, 1869).

Trousseau records the case of a man, æt. 36, who was under his care for epilepsy five years previously. He had been suddenly awakened and frightened in the night "by horrible shrieks from his wife, and a few days afterwards he had his first attack" (liv, i, p. 40).

It is a remarkable circumstance that in some cases of emotional epilepsy, the same alarming event which in the first instance induced an attack was immediately brought vividly to mind, and was uppermost in the thoughts whenever an attack subsequently occurred, although occasioned by other circumstances. A case of this kind is related by Trousseau, who endorses the observation of Jules Faïret, that "many persons who have become epileptics

after strong moral emotions, or intense terror, see again in spirit or before their eyes, on each succeeding seizure, the painful circumstances or the dreadful scene which first produced their complaint." The case is as follows:—

A boy, *æt.* 11, lost his mother. The wound made so deep an impression upon him that he was seized with epileptic convulsions. He was 17 when he was placed under treatment at the hospital, and it was found that on the accession of every fit, which had been of frequent occurrence during the six years, this painful circumstance invariably recurred to his mind. "I am seized through my thoughts," he used to say, and he explained to his medical attendants that his thoughts were always the same, and had constant reference to his loss (*liv*, p. 71).

That many cases of convulsion, of an epileptic character, are incorrectly referred to an emotional cause is no doubt true, but with a liberal allowance for the influence of other causes which may have been overlooked, it is impossible to deny the great importance of powerful emotion in the *ætiology* of this affection. After observing that mental influences are far more frequent causes of epilepsy than injuries, Romberg states that, among forty-four cases, the causes of which were carefully examined by Cazauvieilh, he found that in thirty-one they were due to influences of this nature. He adds, that "no disease is so liable to be produced by Fright as this affection, which may itself be excited by the sight of an epileptic paroxysm; the next most frequent influence of this description being Fear, an agent that came into operation more often in former times, when tales of ghosts and

hobgoblins were the bane of the nursery, than at present: Anger also comes under this category as an exciting cause. The simulation of epilepsy also operates as a mental influence, and is said, occasionally, to pass into the real disease (xxxvii, ii, p. 213).

"The form of epilepsy arising from Fright," observes Marshall Hall, "is of the most intractable character" (xvii, p. 39). In 67 cases, of which the cause was traced by Leuret, it was found that in no less than 35 the first symptoms were preceded by fright. It is to be presumed that an observer like Leuret would satisfy himself that the interval between the attack and the fright was not so great as to render the circumstance merely accidental. Trousseau, who is disposed, I think, to underrate the frequency of this cause, admits that he has ascertained the fact of Fright being a cause "on several occasions," and from him I have obtained the following illustration:—

"Very recently," he says, "I was consulted by a Brazilian, whose first attack seemed to have been manifestly brought on by Fright. Whilst on a long journey through his country he had gone to a lonely inn, where he happened to witness a quarrel between some individuals who were armed, and who from high words came to blows. One of the men, mortally wounded by the discharge of a gun, as well as stabbed with a knife, fell down dead in his presence. He was horribly affected by the scene, and a few days afterwards, whilst dining with a friend, he was seized with epileptic vertigo. Since that time, and for the next five years, he was every day affected in the same way. The attacks were ushered in by a

sensation of great heat, beginning at the navel, and rising up the back, which was followed by absolute loss of consciousness for the space of two minutes or so. They sometimes passed away so quickly that they were not noticed by anybody near him. At the end of five years convulsive seizures supervened, which were at first mistaken for apoplexy, and recurred at intervals of from twenty to thirty days. The vertigo disappeared from that time. He was treated by a physician at Rio Janeiro, and for the space of four years and eleven months he was free from an attack. After this interval the convulsive fits recurred again, as intense and as regular as before; persisting for six years. They then became less violent again, although more frequent, and occasionally attacked him during the night. He stated positively that no member of his family had ever been similarly affected" (liv, i, p. 52).

In this case it will be seen that emotional excitement, although not causing at the time epileptic convulsions, acted powerfully upon the brain and induced the morbid condition which characterises the *petit mal*.

We may fairly draw an illustration from the customs of the Sandwich Islanders, exhibiting the remarkable influence of the emotions allied with imagination upon the bodily frame, in inducing epileptiform convulsions. Mr Ellis says that when a priest imagined that the god had entered his person, he became violently agitated, the muscles of the limbs were convulsed, the body swelled, the features were horribly distorted, and the eyes wild and strained. He often rolled on the ground, foaming at the mouth, and then in shrill cries made declarations which

were regarded as the utterances of the divinity. Then the paroxysm usually subsided, and the priest became comparatively composed. (See 'Polynesian Researches,' i, p. 373.) Doubtless, in some instances, the priests merely *imitated* the signs of the genuine and spontaneous result of the imagination excited by their superstitious beliefs and expectations ; but there is no reason to doubt that in other cases the effects produced were real.

Mr Ellis observes, in the same work, that if any native uses sorcery against another, whose destruction he desires, he employs a tahu-tahu (a charm), to obtain the co-operation of the demons, and to induce the *tii*, or spirit, to enter into the victim of their malice. The parings of the nail, a lock of hair, the saliva, or other secretions, or a piece of the food which he would eat, was the vehicle by which the demon was supposed to enter the person. The sorcerer performed incantations over it at his house ; if food, it was then placed in the basket of the person for whom it was designed, and if eaten, inevitable destruction was expected to follow. When the incantation was performed only on a lock of hair, &c., the effects appear to have been similar and death speedy. " The most acute agonies and *terrific distortions of the body* were often experienced ; the wretched sufferer appeared in a state of frantic madness, or as they expressed it, torn by the evil spirit, while he foamed and writhed under his dreadful power."

Two boys were sent to a man's house for arum roots. He was from home, but the boys went to the field and procured them. The owner, who happened to be a sorcerer, returning before they had left, pronounced the

most dreadful imprecations upon one or both of them, threatening them with the *pifao* or "agony of body from possession, equal to that arising from a barbed spear or hook." The boys returned. One of them was shortly afterwards taken ill, and his friends concluded it was the result of the malediction. The Missionaries, who were sent for, found him lying on the ground, *writhing in anguish, foaming at the mouth, his eyes starting from their sockets, his face distorted, his limbs violently convulsed*. He soon after expired in dreadful agonies. It is said that the boys "apparently took no notice of the threatening," but on this important point, more definite evidence would be required to prove that they did not. But whether they did or not at the time, their superstitious friends would not fail to impress them with their danger, and thus the most credulous or susceptible of them would be in danger of falling a victim to Fear.

On the whole, looking at the character of the symptoms in this and other cases, as also their general uniformity, there can be no doubt that, setting aside those instances in which food was taken and poison probably introduced, many deaths resulted from the influence of Terror and Expectation upon the organic functions. At the same conclusion arrives the thoughtful and observing writer to whom we are indebted for these particulars, and with whom we have had the advantage of conversing on his Polynesian experiences. "Imagining," says Mr Ellis, "that he was already delivered to the sorcerer's power, hope was abandoned, death deemed inevitable, and the infatuated sufferer became the victim of despair." It is quite in accordance with this mode of explanation that the

Europeans were proof against the incantations of the sorcerers.

Dr Arthur Mitchell, in his 'Morisonian Lectures on Insanity,' records a melancholy example of the influence of Fear in inducing convulsions (and subsequently idiocy.)

"A healthy well-nourished boy, nearly two years old, was lying in his cradle, when a cock perched on the hood. The boy was at first amused and delighted, and made vain efforts to reach the bird with his hands. These signs of delight, however, began to grow less evident, the child ceased to smile, but his attention continued to be intently fixed on the animal, which, in its turn, appeared to become interested in the child. Up to this point the little fellow gave no sign of terror; but there was something like it, though still unexpressed, when the cock, stretching his neck, put his head down and looked closely at the boy's face; and when, raising his head again, he flapped his great wings and uttered a shrill cry, the child gave one sharp cry of pain, and was instantly convulsed. Three or four fits occurred during that and the next day, but never again. The boy, however, grew up an idiot" (xxxii, March 19, 1870).

Such convulsions are the physical expression of the violence of the central emotional disturbance, and thus are an exaggeration of the conditions described at p. 257, under the head of Sympathy.

Puerperal convulsions.—It is well known that these occur frequently from psychical causes. Dr Gooch, than whom few have had more experience, observes that "depressing passions of the mind produce this complaint ;

unmarried women, who have passed the latter months of pregnancy in solitude and wretchedness, are very likely to be attacked with it; and it is found in lying-in hospitals which admit unmarried women, that a large proportion of cases of puerperal convulsions occur among females of this class." ('Practical Compendium of Midwifery,' p. 243.)

Sir James Simpson reported the case of a lady who after her confinement had puerperal convulsions, in consequence of receiving a packet containing a living mouse. We write from memory, having mislaid the reference, but if we remember rightly, the intention of the sender, another lady, was to frighten the patient.

This is the most convenient place to refer to other forms of spasmodic muscular action, arising under emotional excitement, and ordinarily styled *hysterical*, and presenting all degrees of irregular movements, from the simplest spasm to the severest convulsion.

When we speak of irregular movements which are considered hysterical in their character, we are in danger of being lost in vague generalities; in no disorder are we so easily carried away by a mere name, as in hysteria. One thing, however, is certain, that while a considerable number of cases are clearly referable to uterine and ovarian disorder exciting reflex action of the sensori-motor apparatus, many as clearly originate directly in emotional disturbance of the same centre. The symptoms arising from these different causes may be precisely similar, and, without the history of the case it would be impossible to decide as to its psychical or physical origin. If we hold, as undoubtedly we must, that all physical phenomena

(including irregular movements) which can be induced by reflex action from the irritation of a bodily organ, can also be induced by central cerebral irritation, then, even if we agree with those who define hysteria as "a reflex neurosis dependent on sexual irritation," we must believe that emotional excitement can primarily produce the same disorders, without springing from or involving the peripheral organs. At the same time it is manifest that in a large proportion of cases, the condition of the uterus and ovaries in women, and the corresponding state of the reproductive organs in men, induce a morbid susceptibility of the sensori- and excito-motor centres, which renders them peculiarly liable to emotional excitement. The former is the predisposing, and the latter the exciting cause. On the other hand, it must be admitted that, in many instances, the morbid condition of the organs is itself induced by the downward action of the feelings.

To determine which has been the *point de départ* in this physico-psychal circle is often impossible. We may, however, frequently ascertain how the first outward manifestations of the disorder have originated, and be certain that they have been called into action by a central emotional stimulus. In women there is confessedly greater emotional instability and in them reflex action is easily excited, but this natural susceptibility, or "hyperæsthesia," is no doubt greatly aggravated by uterine irritation. This heightened tendency of the nervous centres to act independently of volition, exposes them to irritation from every source, peripheral or centric, uterine or emotional. When persons in health, subjected to the excitement of popular tumult and alarm, or the influence of religious

revivals display the group of symptoms ordinarily understood as hysterical, we can have no hesitation in acknowledging a psychical—an emotional—cause. That a predisposition or diathesis exists (the female nervous system being in itself a predisposing cause), which occasions the symptoms to be something more than the ordinary effects of Fear—pallor, tremor, &c.—and something less than genuine epilepsy, would seem clear. Emotional states being so intimately connected with hysteria, the attempt is too often made to comprise under this one name, the various phenomena which are excited by powerful and alarming appeals to the feelings, or by fright of any kind, instead of remembering that with different proclivities, different forms of disorder will be elicited, and not all properly speaking hysterical, although having, in common, the automatic and reflex character belonging to hysteria. All hysterical movements are reflex or automatic, but all reflex movements are not hysterical, if we employ the term in any distinctive sense at all. While in some, the effects of violent mental impressions are almost *nil*; in others, slight tremor and pallor; in others, syncope; and in others, convulsive seizures, which in those predisposed or subject to epilepsy will be really epileptic; in a fifth class we see what every one recognises as a fit of hysterics, or hysterical simulations of epilepsy and other motor affections. Of course the attack takes its colour from the character of the excitement which produces it, as is witnessed in religious revivals. Were we to take our description of the scene often presented on such occasions from the accounts of one which occurred more than half a century ago in Cornwall (when four thousand in various

towns—Falmouth, Redruth, Camborne, &c., were convulsed), and compare it with the descriptions so frequently given in recent times of the effects produced in America, Ireland, and England by excited harangues and denunciations of eternal perdition, we should not fail to find a striking similarity in the symptoms. For instance, the account given in 'Fothergill and Want's Medical and Physical Journal' (lxix, p. 145), so long ago as 1814, would do as well now as then for one class of cases. Thus we find—Yawning, violent spasms of the muscles of the eyelids, the eyeballs themselves being fixed and staring, frightful contortions of the countenance, then convulsions (passing downwards) of the muscles of the neck and trunk, sobbing respiration. General agitation and tremors, the head thrown from side to side, convulsive beating of the breast, and clasping the hands, accompanied by many frightful gestures, followed; the lower extremities alone escaping. At Ballymena, at the commencement of the Irish revivals, in our own day, the physical phenomena were very similar, and others were present of a more tetanic character. We are indebted to Dr Massie's "Revivals in Ireland" for the following illustration of the influence of the emotions upon the body, especially the muscular system:—A neatly attired young woman, about 22, had been stricken an hour previously, and was supported in the arms of an elderly female, who was seated upon a low stool. Her face was deadly pale, her eyelids firmly closed, except when partially raised by a convulsive paroxysm, and then no part of the eye was visible, except a narrow line of white; pulse intermittent; great perspiration; arms extended or elevated, and then

the hands clasped with great energy, and her features rigidly fixed into an expression of supplication; utterance rather incoherent; agonising expressions of despair. A striking expression is employed in one description of the stricken. "In all cases it appeared as if every fibre of the heart and every muscle of the body were wrung with the same excruciating torture." A young woman is described as lying extended at full length; her eyes closed, her hands clasped and elevated, and her body curved in a spasm so violent that it appeared to rest, arch-like, upon her heels and the back portion of her head. In that position she lay without speech or motion for several minutes. Suddenly she uttered a terrific scream, and tore handfuls of hair from her uncovered head. Extending her open hands in a repelling attitude of the most appalling terror, she exclaimed, "Oh, that fearful pit!" During this paroxysm three strong men were hardly able to restrain her. She extended her arms on either side, clutching spasmodically at the grass, shuddering with terror, and shrinking from some fearful inward vision; but she ultimately fell back exhausted, nerveless, and apparently insensible. In a third case, the face of a woman was deadly pale, the features rigid, the lips clenched, the hands clasped firmly together, and the head moved from side to side, as if to indicate internal agony.

At other times the force of the emotions fell chiefly on the respiratory centres; the thoracic muscles were spasmodically fixed; "an intolerable weight was felt upon the chest, and a choking sensation experienced." Such cases have more especially suggested the employment of the word hysteria in reference to the revival

cases, because the most prominent symptoms of hysteria betoken functional disorder in the range of the respiratory nerves.

It is obvious that many restrict the term hysteria to those cases in which there exist symptoms which common consent attributes to it (sobbing respiration, globus hystericus, &c.), in full force at the time, and doubtless they constitute typical examples ; but without these we may strongly suspect from some one symptom in the history of the case, that the same morbid susceptibility of the nervous centres is present, and causes reflex phenomena, which are the counterfeits of nearly all the disorders to which the frame is liable. The single circumstance of the disorder occurring in a young female (*e.g.*) is itself a presumption in favour of the hysteric character of this susceptibility.

The important point here (though not nearly so much so as to distinguish between functional and organic disease) is not to refer to this hysteric susceptibility or exaltation, reflex phenomena which arise without any evidence whatever of its having been present ; for clearly an excessive stimulus of the emotional centre may cause a healthily susceptible sensori-motor apparatus to respond too violently, in short, convulsively. To which class to refer phenomena which are often so closely allied is a question the decision of which will depend upon the whole history of the particular case. Hence and from using the term in the broad and narrow sense, differences of opinion arise. Thus we find Dr Cuthbert, of Londonderry, himself a witness of many of the Ulster revival cases of 1859, protesting in the 'Medical Times and

Gazette' of Nov. 5th of that year, against what he regards as the too indiscriminate reference of the whole to the convenient category of hysteria. There was, he says, one class of cases in which the mental condition appeared to regulate altogether the physical state, and there was no globus or diuresis; cold water assiduously applied had no effect; with returning mental quietude the bodily symptoms declined. In a second class the morbid symptoms were no doubt hysteric, and the term "cataleptic hysteria" is applied to them by the writer. Lastly there were cases in which hysteric symptoms arose, not, apparently, directly from the impressions produced on the mind by the Revivalist preachers themselves but as the result of sympathy and imitation. In a letter written recently (June 16, 1870), Dr Cuthbert informs me that he believes the conclusions he then arrived at to be correct. "In a large number of cases the physical symptoms were but the natural expression of mental impressions. I still consider that the symptoms in a large number of cases were not those of hysteria." I may add a significant remark, although it has nothing to do with my present object—"The good effects, I think, were *in inverse proportion* to the physical manifestations." I should observe that in the cases which came to Dr Cuthbert's knowledge, prostration, rather than convulsion, was the prominent feature, and that they do not, therefore, correspond in their character to those described in 'Fothergill and Want's Journal,' which with some variation, were re-produced in some of the Irish Revivals.

Dr Babington (lxix, p. 157) quotes from the third

volume of the 'Edinb. Med. and Surg. Journal' an account of a convulsive disorder in the Orkney and Shetland Islands written about a century ago, from which an extract may be given here. "At first this distemper obtained in a private way, with one female, but she being seized in a public way at church, the distemper was communicated to others, but whether by the influence of Fear or Sympathy is not easy to determine. However this was, our public assemblies, especially at church, became greatly disturbed by their outcries." "When any violent passion seized them, or on a sudden surprise, they would all at once fall down, toss their arms about, with their bodies into many odd shapes, crying out all the while most dismally, throwing their heads about from side to side, with their eyes fixed and staring." "Few men are troubled with this distemper, which seems more confined to women, but there are instances of its seizing men, and girls of six years of age. With respect to the nature of this disease, people who have made inquiry differ, but most imagine it hysterical; however, this seems not entirely the case, as men and children are subject to it; moreover, it is a new disease in Shetland, but when imported none can imagine In Northmaven a cure is said to have been effected by a very singular remedy, which if true, and there seems no reason to doubt it, shows the influence of natural causes in removing, as well as inducing convulsive disorders." Dr Babington adds "the cure is attributed to a rough fellow of a Kirk officer, who tossed a woman in that state, with whom he had been frequently troubled, into a ditch of water. She was never known to have the

disease afterwards, and others dreaded the same treatment."

That emotional disturbance can produce hysterical movements and other symptoms, in the male sex, and not only so, but without any connection with the development or disturbance of the reproductive organs, is well illustrated by the following case reported by Dr Wilks (xlv, March 13, 1869):—

"Some months ago I received an urgent message to visit a gentleman, a short distance from town; when I arrived at his house he was sitting in his parlour, and not looking ill. I expressed some little vexation at being summoned so hastily. He said he was now much better, and commenced explaining to me the reason of the summons, when he began to cry; presently the cry reached the stage of sobbing; this became louder and louder, and more violent, until it changed into a laugh, which he was totally unable to suppress, and I became a witness of the most marked attack of hysterics that I had ever seen in either sex. He presently fell back in the chair, quite exhausted. He was a man thirty years of age, with a large black beard, and had as manly an appearance as you would wish to see. His wife then told me that he had been speculating, that he was a ruined man, and would have to leave his house and family. He had returned home that evening shortly before I was sent for, and the thought of the prospect before him was more than he could bear, and thus the cause of the attack. Whilst she was relating this he grew calm, and then commenced to talk to me, saying how foolish he was, but could not refrain from referring

to the circumstance of his misfortune. He had not proceeded far when he was again overcome: another laugh commenced, and then he broke out into such a loud and involuntary fit of laughter, that the noise could be heard throughout the whole house. It only ended with his utter exhaustion. I saw him a few days afterwards, and he was pretty well. This gentleman had simply an hysterical attack from violent emotion."

The great importance of distinguishing between the hysterical counterfeits of disease, and forms of disease involving more or less structural change, has been already referred to. Only the other day a case of convulsions, which was pronounced to be hysterical by Trousseau, was regarded by Dr Handfield Jones as undoubtedly epileptic. The fact is, the diagnosis can often be certainly made only when the case has issued either in recovery or death, for the strongest diagnostic sign is that the symptoms of hysteria, however alarming, whether resembling coma, convulsions, tetanus, or paralysis, do not tend to endanger life or prove permanent; at least in these forms, for they may end in insanity. Emotional excitement, acting centrally, induces an imitation of the corresponding diseases originating in organic change, just as can at any time be induced by Braidism in susceptible subjects. It has this feature in common with all functional affections; that it is a disorder which may quickly come and as quickly go, demanding a treatment and admitting of a prognosis, wholly different from those called for in disorders involving structural changes.

A good example of spasm of the eyelids of mental origin is recorded by Dr Weir Mitchell. It occurred in

a lady, shy from childhood, blushing easily, and excessively embarrassed by the presence of strangers. "The trouble of her eyes came on for the first time at a watering-place. When going to dinner and sitting down, she observed that a great number of persons were looking at her as a last arrival. She mentioned the fact to her husband and was almost immediately attacked by a violent closure of the eyes, and was obliged to be led in this condition from the table. When this had happened once, you may well imagine that every repetition of the original cause brought back a return of the disorder, until at last it was quite impossible for her to go to table in the room with other people. You will see that in this case Emotion and after the establishment of the symptoms, the despotic control of an unpleasant memory were competent to create and then to continue this grave inconvenience. I succeeded in inducing her, however, to make an effort to go to dinner without regard to what happened, and to face the slight unpleasantness and the talk which her appearance might create. Her courage was finally rewarded by a cure which was perfected, so to speak, by a long absence in Europe and constant exposure to the very difficulties which had given rise to her first attacks" (xcix, p. 125). It should also be added that the lady had over-studied.

In another case related by the same physician, a girl of thirteen, began to limp after an attack of ague; hip-joint disease was diagnosed by the travelling agent of a surgical institute, where she was treated, grew worse, and "under the influence of the discussions as to the hip-joint disease and its symptoms," the right leg became contracted at

the knee and hip. Both hips suffered and splints were applied. The arms also became flexed, the feet being extended, while the eyelids closed and remained spasmodically shut. Judicious treatment was adopted. The legs were forcibly straightened, and by this and other means the contractions and spasms were removed (xcix, p. 81).

From our present standpoint, a purely emotional one, we have only to admit that if a powerful emotion be aroused, whether from without or from within, it may discharge itself through the sensori-motor ganglia upon any of the nerves and muscles of the frame, so as to cause tonic or clonic spasms—the globus hystericus being the natural sequel of irritation of the medulla at the point of origin of the vagus or accessory. Should the emotion, however, by its action on the vaso-motor nerves, violently contract or dilate a feeble or atheromatous vessel in the brain, or overstrain the nerve tissue itself, serious and fatal organic changes may follow, and such cases are at once understood to belong to the non-hysterical class. When we see two cases of hydrophobia,—one caused by actual virus, the other by emotion,—it is easy to understand (and can be practically demonstrated by Braidism) how the latter is but the reflection of an image of the real disease intensified by Fear, and that the symptoms may pass away when the image is removed from the mind, but otherwise may prove fatal. So of chorea: we can see that an affection of the cardiac valves which causes embolism and consequent chorea, although producing the same muscular movements, involves a very different physical condition from that which obtains in

chorea of emotional origin. There may or may not be symptoms in combination with it, which warrant our reference of these cases to hysteric excitability.

Whenever the emotions master the Will, the muscles are liable to spasm; when voluntary power is first embarrassed, and while the struggle is maintained, muscular *tremors* occur. It is afterwards, when the Will is subdued, that various spasmodic movements take place. In reference to the tremor constantly witnessed as the result of Fear and Joy, and consistent with health, it is unnecessary to do more than to state the fact, and pass on to the serious pathological condition marked by tremor, and frequently produced by emotional states.

Trembling Palsy, Paralysis Agitans.—Medical experience fully confirms the remark of Marshall Hall, that by far the most common cause of the accession and of the aggravation of paralysis agitans is Emotion; hence during sleep the movements are calmed. Hall cites the case of the Abbé —, who, during the reign of terror in France, was seized by the mob with cries of “à la lanterne!” He escaped, “but he was ever afterwards subject to violent tremor of the limbs.” Also that of a gentleman in whom the disease was induced by the mental anxiety occasioned by a ruinously expensive parliamentary election. He was unable to walk alone, but walked very well “if his wife gave him her hand in the gentlest manner.” The loss of power over his muscles was complete when anything occurred to excite agitation or emotion. In a third case, the disorder also originated in anxiety about money; and the son of this patient being entrusted with a large sum of money to convey to a bank, and delaying his

return by going to the theatre, was the cause of a great aggravation of the symptoms, almost amounting to hemiplegia. M. Hall, who speaks of paralysis agitans as emphatically "a disease of emotion," adds that he could adduce many examples of the same kind as the above (xvii, p. 23).

A case of paralysis agitans, under Oppolzer, is an excellent illustration of the disorder :—

The patient, a man, *æt.* 60, happened, during the bombardment of Vienna in 1848, to get in the midst of the fight. He was struck with such terror that he could not return home by himself, and had to be taken there. He had scarcely got over his fright when a bomb burst near his house and alarmed him again. A few hours afterwards, on trying to take some food, he found himself perfectly unable to use his hands, because as soon as he tried to move them, they began immediately to tremble violently. He noticed also after a short time that his lower limbs trembled in the same manner, but less violently so that he could still walk. The disease not only resisted all the measures employed against it, but also grew gradually worse. The trembling persisted even when he lay down ; and involved other muscles ; lastly, paralysis was super-added to it. After a few years he became incapable of standing erect, and as soon as he made the attempt, he had an irresistible tendency to fall forwards ; so that in order to avoid falling down, he was obliged to lay hold of neighbouring objects, or to walk hurriedly. The keenness of his senses and of his intellectual faculties had diminished slowly but progressively. Twelve years after the fright he fell down in a fit, and was unable to rise,

though not unconscious, and a few weeks after was admitted into the Hospital under Professor Oppolzer, from whose observations Trousseau gives the particulars. On admission the muscles of the face, neck, and upper limbs were affected with violent trembling, only suspended during sleep. The tremulous muscles were at the same time rigid. His strength rapidly diminished; he had severe convulsive seizures, and he died three weeks after admission. A *post-mortem* examination revealed, among other appearances of less importance, very decided induration of the *pons Varolii* and the *medulla oblongata*. The spinal cord was firm and the medullary substance of the lateral columns, principally in the lumbar region, presented opaque grey striæ. On making a microscopical examination, there was found in the substance of the *pons Varolii* and *medulla oblongata* an abnormal production of connective tissue, accounting for the induration of those parts. The opaque striæ in the lateral columns of the cord were due to the presence of connective tissue in process of development. In the substance of the *right optic thalamus* there was an apoplectic cyst of the size of a small bean, the walls of which contained pigment. (For the case in full, see *liv*, I, pp. 446—9.)

In another case of paralysis agitans, reported by the same physician, the disorder originated in "deep emotions:"—

The patient, an advocate, had attended his wife assiduously for a twelvemonth before her death. Grief and sleepless nights had exhausted him. Such nervous irritability followed that he could not bear to hear the ringing of bells, or the least noise. He soon observed

that his arm seemed to shake slightly, and that the movements of the whole limb, but of the hand especially, became more and more difficult. In a short time the leg on the same side became affected also, and his symptoms grew worse, without being at all benefited by treatment. After a time he had to give up writing. Trousseau remarks that the patient looked like a paralytic, but on examining him carefully, it was soon made clear that the paralysis was only apparent (liv, p. 442).

Chorea.—Of spasmodic affections we will now take chorea to illustrate the influence of the emotions upon the nervous and muscular systems. Emotion may so injuriously affect the nervous system that the Will can no longer direct or control the muscles which then become the sport of the sensori-motor apparatus.

Emotional excitement may not only originate the disorder, but when once established, whether arising from this or another cause, may induce or aggravate the spasmodic twitches which characterise the disease.

Trousseau puts the practitioner on his guard against exaggerating the gravity of a case of chorea seen by him for the first time, inasmuch as the emotion occasioned by a stranger increases the violence of the convulsions, however the disorder may have originated.

In the 'Medico-Chirurgical Review,' July, 1863 (p. 492), Dr Peacock insists upon the fact that the most frequent exciting causes of chorea are more or less violent emotions, Fear, Grief, excessive Joy, &c., and that hence it is common among females. In the cases which he analyses, the emotional causation was traced in 38·7 per cent. of the total number. Dr Angel Money

has found in analysing 214 cases of chorea that fright alone was the cause of the attack in 60 instances, or 28 per cent. (liv, Jan., 1883, p. 513).

One of the worst cases of chorea I have seen was caused by fright in consequence of a fire in the house in which the patient, a woman, lived.

Dr Todd gives the case of a boy, æt. 9, thin, but otherwise healthy-looking, who, a day or two before the symptoms appeared, was much frightened by his sister, who had covered herself with a white sheet and appeared before him unexpectedly while he was in bed. "There is here then," observes Dr Todd, "that which we so frequently—indeed, I might say, so constantly—observe, namely, the connection of sudden fright with the origin of these cases. . . . Although a certain diathesis seems to be always present in cases of chorea, the disease seldom occurs without some sudden emotional excitement, such as fright." None of this boy's family had been similarly affected, but there was a tendency to rheumatic complaints, and the patient himself had been attacked with rheumatic fever (giving rise to endocarditis) ten weeks before admission, and two months before the appearance of the choreic symptoms, which came on suddenly. The boy went to bed as well as usual, but in the morning, when his mother went to give him his breakfast, she was surprised to find that he could not hold his cup, and that he was quite helpless. He had lost the power of directing his movements properly; the motions of his limbs were exaggerated and ungovernable and if he attempted to take hold of anything, his arm appeared to be violently jerked, in the right direction

perhaps, but usually beyond the object of his search, as if by some power over which he had no control. Among the early symptoms which manifested themselves in this way was difficulty of deglutition, which came on and continued for some days prior to the more common and characteristic symptoms. The dysphagia was due partly to the want of full contracting power over the tongue, and partly to a want of due harmony in the action of the pharyngeal muscles. This symptom is peculiarly interesting, from the marked connection which subsists between this malady and emotional excitement. The treatment of this boy consisted of splashing him with cold water every morning, and at the same time feeding him well. He improved much in general nutrition, the irregular movements diminished, and when the report was made—eighteen days after admission—he was able to walk without assistance.

Two other cases of emotional origin are given by Dr Todd, one a girl, æt. 14, with a history of rheumatic fever when two and a half years old, who was met and accosted about three weeks before the appearance of the symptoms by a drunken man, and was very much alarmed at the time. On this case Dr Todd remarks that, although the interval seems very long, "I think we may fairly refer the excitement of the disease to this cause; in many instances, indeed, even longer periods have elapsed between the fright and the accession of the malady. . . . I have known it occur six weeks before the chorea manifested itself."

In the next case, the patient, æt. 12, a sister of the foregoing was frightened by a drunken man, a few days

after which she felt pain in the right arm and leg, and experienced a tingling in the fingers, which became restless and fidgety. Soon after, the left extremities became similarly affected; then came twitchings in the face, and in the course of a fortnight from the time of the fright, irregular movements became general; she lost the power of standing or walking, and her articulation was almost completely destroyed. In both these cases recovery followed the splashing treatment, succeeded by quinine and iron (lxxiii, p. 428-39).

Consistently with his views as to the special localisation of emotion in the brain (see p. 166), Dr Todd referred the seat of the disturbance in chorea to what he regarded as the emotional centre and describes the sequence of phenomena thus:—"First, a peculiar diathesis; then a more or less enfeebled nutrition; thirdly, a strong mental impression, which disturbs the centre of Emotion, and through it deranges the action of more or less of the nervous system, and of a corresponding portion of the muscular system." (l.c.)

Without adopting Dr Todd's theory it may be said that in cases of emotional chorea, violent mental excitement must have produced such a change in the nervous tissue, that the normally superior power of volitional over muscular movements was suspended or destroyed, and the sensori-motor apparatus left to its uncontrolled automatic action, or perhaps it would be more correct to say that the co-ordinating power is suspended, for automatic action is not necessarily spasmodic. As in epileptic and other convulsions, it is easier, however, to say from our knowledge of the physiology of the nervous system, what

part is in an abnormal condition, than to determine in regard to vascularity and innervation in what it consists, and how it is brought about. Probably all we can say with certainty, is that the shock which the brain receives from a violent emotion like Terror, disturbs the normal relative nutrition and vascularity of the volitional and motorial centres.

Popular tumults are well known to have occasional attacks of this troublesome complaint. During the Bristol Riots of 1833, an excited imagination as to what might occur, acting through Fear, produced this result. Dr Carpenter says that a remarkable number of cases were admitted into the infirmary there, within a few weeks afterwards. He also mentions a case in which any, even trifling agitation of the feelings, caused the most extraordinary contortions of the limbs and face. "This gentleman, a man of education and intelligence, of extreme benevolence of character, and a mind habitually well regulated, can scarcely walk in the street without being liable to the induction of paroxysms of this kind, by causes that could scarcely have been supposed capable of thus operating. For example, he was one day seized by one of these attacks in consequence of seeing a man miss his footing (as he thought) in descending from the top of an omnibus; and the pleasurable excitement of meeting a friend usually induces the same result. The tendency varies very considerably in its degree, according to the general condition of his health" (viii, p. 791).

In a case, that of a girl, æt. 18, reported by Trousseau and denominated "hysterical," the cause was fright. She stammered in a singular manner, repeating with extraor-

dinary volubility, and for a pretty long time without stopping, the last syllables of the word she attempted to say, articulating the first syllables with difficulty. It was a remarkable fact, however, that she did not stutter when she sang, and no modification of speech could then be suspected (liv, i, p. 434). In a second case, the cause was intense grief from the death of a sister. The patient was a lady, æt. 19. Strange convulsive movements of the head and upper limbs were the most prominent symptoms. When Trousseau saw her, her aspect was that of perfect health, but her whole left side was the seat of violent choreic movements—so that she was in danger of hurting herself against the furniture. An attempt to arrest them by taking hold of her hand made them worse; there was one means, however, of quieting all this agitation, as if by magic, namely, the piano. She could spend an hour or two at the instrument, playing to perfection, and with the greatest regularity; in excellent time, and without missing a note. This single fact would have been sufficient in Trousseau's opinion to show, in the absence of other proofs, that this was an example of hysterical chorea, and not genuine St Vitus's dance. When she wished to seize an object, she could do so at once, and would never drop it (p. 434.)

Recently (1882) the author saw in St Thomas's Hospital under Dr Bristowe, a girl with right hemichorea, due to the alarm experienced on being galvanised.

We pass on now from well-marked cases of chorea to a few other examples of spasm, more or less nearly allied to it. Fear, in the form of a vivid dream, has produced spasmodic action of the muscles. The case of a peasant

is related by Tissot, who having dreamed that a snake had coiled itself round his arms, started out of sleep much terrified, and was afterwards subject to spasmodic movement of the arm, sometimes lasting for an hour at the time, and returning frequently in the course of the day (1x).

Dr Althaus, in the 'Medical Times and Gazette,' May 25th, 1861, reports the case of a lady suffering from spasmodic contractions of the left trapezius and cleidomastoid muscles, consequent upon a violent emotion excited by witnessing an accident in the street:—

“At first the contractions were slight and only occurred when the patient was excited, when in society, or if spoken to. The affection gradually became stronger and more troublesome.” There was no pain unless the contractions were unusually violent. Dr A. says, “the influence of emotion in exciting the trembling and spasms of the muscles was most striking in this case. The patient said that she suffered far less when she was alone and if the room was darkened; but if she thought herself observed and the object of wonder and pity, she became much worse; she had therefore, almost retired from society, and was only with difficulty induced to leave her rooms, from which she used to shut out the light. It may be added that blisters and purgatives produced no, and valerianate of zinc but slight, benefit, while Faradisation of the muscles and skin soon effected a complete cure, not a trace of the affection being observed, even when she was excited.”

Dr Althaus also gives the particulars of a case of the same disorder in a brewer, following and apparently due

to the circumstance that when "driving, his horse fell and broke its neck, which gave him a great shock." He had also had much anxiety, but it ought in fairness to be mentioned that shortly before the attack he slept on a damp couch. He was benefited by the remedy employed in the last case, after calomel and laudanum, blisters and leeches had wholly failed to give relief. Dr A. remarks, "In cases in which the emotional nature of the complaint is strikingly apparent, Faradisation of the skin, which produces a powerful impression upon the nervous system, is preferable. If the influence of emotion is less marked, and the reflected muscles are only slightly rigid, while the nutrition of the corresponding muscles of the other side of the neck is impaired, Faradisation of the latter ought to be performed in order to restore the lost equilibrium."

The influence of emotion in causing spasm of the muscles of the *larynx and glottis* ("asthma thymicum"), is well illustrated by the following case from the 'Annales Médico-psychologiques,' 1849, p. 450 :—

Marie Meyer lost her child, eight months old, to whom she was greatly attached. The grief this circumstance occasioned, produced a painful sense of constriction in the larynx. Emotion of any kind at once aggravated it, causing great difficulty of breathing. On one occasion, for two hours, the attack was so violent, that she was blue in the face, speechless, scarcely conscious, and in fact all but suffocated. On the following day she was admitted into the Hôtel Dieu, Lyons, under Dr Lavirotte's care, after having suffered from her malady for seven months. She only remained in the hospital about

three weeks, during which she was very simply treated, and left relieved, but not cured.

Trousseau, after observing that laryngismus stridulus generally comes on "under the influence of some mental emotion or of a fright," adds "I was once consulted for a little boy, who, from the beginning to the end of his first dentition, was subject to such seizures. He was of a very excitable temperament, and the least annoyance brought on an attack" (liv, i, p. 356).

Paroxysms of *cough* of an hysterical character are often, as is well known, caused by depressing emotions, but it is not so well known that apparently hysterical cough may accompany and mask really organic cerebral disease. In three such cases reported by Dr Stokes, there was evidence of meningitis, in one case by post-mortem examination, and in the other cases by very suspicious symptoms. "It is a curious fact," he says, "that in three of the most extraordinary cases of hysteric or nervous coughs which I have witnessed, there was evidence of such an occurrence." ('Treatise on Diseases of the Chest,' p. 266).

Singultus.—An obstinate case, the result of Emotion, is reported by Romberg (xxxiv). A Polish Jewess, æt. 21, had a violent fright at the first outbreak of the Cracow revolution, and suffered from hiccough in consequence. Three years afterwards she was admitted into the Policlinique, at Berlin. Owing to a complication with spasm of the glottis it was particularly loud and sonorous. A spasmodic throwing back of the head, during each attack, showed the participation of other nerves than those involved in hiccough. There was

tenderness of the epigastrium and of the spinous processes of the lower cervical and upper dorsal vertebræ, leucorrhœa, with regular menstruation. All the remedies previously tried had been ineffectual. It is not stated whether the treatment at the Policlinique proved more successful.

Yawning is produced by sympathy rather than direct emotional influence. Spasmodic laughter (*risus convulsivus*) may arise in both ways, but I am not acquainted with any case of psychical origin in which it assumed a serious form. In a fatal case of physical origin, in which this was a prominent symptom, the medulla oblongata was found to be the principal seat of disease.

Vocal spasms (*stammering* and *stuttering*) are constantly aggravated by bashfulness, while the courage excited by an emergency may remove them, as happened with Charles I, who, though a stammerer, is said to have been entirely free from the affection when he spoke at his trial. "Stammering," Marshall Hall observes, "would scarcely exist without emotion," and he likens it to the nervous tremor which often renders it almost impossible for some persons to sign their name in public. I have not been able to ascertain that any cases of permanent stammering have owned emotional excitement as their original cause.

Pertussis.—Among the exciting causes of whooping-cough the emotions are well known to play a considerable part. Romberg specially mentions vexation and alarm.

Spasm of pharynx; hydrophobia.—Spasmodic contractions of the muscles of the pharynx have been frequently

caused by fear, chiefly connected with the idea of hydrophobia. Such cases illustrate the remarkable influence exerted upon the body by what is popularly understood as the Imagination. It is so frequently associated with an emotion, and owes so much of its force to this element, that it is, as we have before had occasion to observe, often impossible to separate them and study the action of the Imagination, regarded as the purely intellectual faculty of *imaging*. In the following cases it is obvious that the emotion of Fear caused the symptoms :—

Romberg cites from Chomel the case of a physician at Lyons “who assisted in the dissection of several hydrophobic patients, and was seized with the conviction that he had been inoculated with the virus. He lost his appetite and was sleepless ; when he attempted to drink he was seized with choking and spasm of the pharynx ; for three days he wandered about the streets in a state of despair till at last his friends succeeded in convincing him that his malady had its foundation in his mind ” (xxxiv, I, p. 183). Trousseau says he has known physicians—men of strong minds and courage—who, although well aware of the conditions needed for the development of rabies, were subject for several months and even years after attending and dissecting persons suffering from hydrophobia, to more or less distressing attacks of dysphagia, on the mere recollection of the awful scenes which they had witnessed. “ Time alone got rid of their nervous susceptibility which manifested itself in the shape of spasm of the pharynx, and they cured themselves of it by appealing to their knowledge of the disease and by forcing themselves to drink some liquid whenever they

felt the sensation coming on" (liv, i, p. 692). It may here be observed that, according to this physician, there is in nervous hydrophobia dysphagia only, and no general convulsions, the spasm affecting the pharynx alone, while the respiration is unaffected. If the dysphagia extends beyond four days, the strong probability is that the disorder is not due to any virus but solely to the Imagination.

Rush wrote an able essay (and when are his essays not able?) on hydrophobia, in which he assigns an important rôle to the influence of "Fear" and "an involuntary association of ideas." He affirms, undoubtingly, that, cases of spontaneous hydrophobia have arisen from these causes.

It is probable that persons who have been attacked with hydrophobic symptoms after the bite of a dog doubtfully mad, have suffered from the fearful anticipation of the disease only, and not from any canine virus; the inference drawn in such cases that the animal is labouring under the disease being too hasty. When a wound has been inflicted by a really rabid animal and no effects have followed until many months after, emotional excitement may be the occasion of the outbreak of the symptoms, especially should it be in the form of Fear, and should "the nerves" at the time be in a susceptible state. As Dr Rush graphically expresses it, the man's fears are then *let loose upon his system* and rapidly produce a dread of water which appears to be wholly unconnected with the previous bite. "It is of no consequence whether the dread of water be the effect of the saliva of a rabid animal acting upon the fauces, or of a morbid

excitement determined to those parts by any other stimulus" (lxi, ii, p. 203).

Romberg cites a case from Trollet in which mental emotions excited the disease, three months and a half after the bite had been received. Up to that time the patient had been leading a very quiet life, but after yielding to excesses at a fair, he was in returning met by a dog which suddenly attacked his horse. Then all the details of his own former accident recurred to his mind; a few days after hydrophobia made its appearance, and carried him off on the third day (xxxiv, ii, p. 145).

The Memoirs of the Royal Society of Sciences of Montpellier contain a history of two brothers bitten by a mad dog, one of whom went to Holland, and did not return for ten years. Learning on his return that his brother had died from hydrophobia, he was seized with hydrophobic symptoms himself, and died (lx, p. 143).

Chomel held that in such cases it is highly improbable that the original virus causes the attack after the lapse of so many years, and that it is much more reasonable to refer it "to the well-demonstrated influence of the Imagination in the production of rabiform hydrophobia. While admitting that spontaneous hydrophobia might end fatally, he regarded all cases of hydrophobia, terminating in recovery, as originating in causes independent of the virus. Trousseau is inclined to limit the influence of the virus to a period of about twelve months; all cases occurring subsequently being more probably due to Imagination and Fear.

Emotional excitement not related in any way to the disorder appears able to develop an attack, if the virus is

latent in the system. A few months ago a painful case of this kind was reported in the 'Daily Telegraph' as occurring in the United States, of which the following is a condensed account :—A young woman went into her father's farmyard to kill chickens. One of the birds was picked up by the house dog, which ran off with it, and on being pursued by the girl bit her frightfully, lacerating the arm. Her mother and brother, who came to her assistance, were also severely bitten. The wounds of all three, nevertheless, healed in the course of time, and the matter had been almost forgotten, pushed out of memory indeed by a much more interesting event—the approaching marriage of the girl. All went on well for about two months, till the wedding morning, when the mental excitement brought on a shiver at the sight of water when she was about to wash, followed by other symptoms of a hydrophobic character. Although the symptoms were so alarming, she went through the ceremony ; but scarcely was it over when she was seized with spasms, and after a rapid succession of paroxysms, died in her husband's arms.

Copland cites from Pinel the case of a soldier alarmed at midnight by his comrades, who was immediately attacked with convulsions, burning and constriction of the throat, dread of liquids, and expectoration of a copious frothy saliva. "He was certain that he was never bitten by any animal. The symptoms increased and he died. The examination presented nothing extraordinary. A quantity of mucus only was found in the throat" (lxx, Art. "Rabies").

Quite recently (xlv, June 18, 1870) Dr Finlay has

reported a case of nervous hydrophobia occurring in a boy of 12, "produced simply by mental anxiety and terror:—

In the beginning of the year he was bitten by a small terrier on the left leg. The wound was slight, and healed without difficulty. No ill effects were observed, as regards the bite, for two months, but in the interval he complained of pains in the chest, and spat blood, for which he attended the Brompton Hospital. In the beginning of March he complained of severe pain in the leg, at and about the bitten part, at first stationary, but afterwards it assumed the form of an epileptic *aura*. He described this sensation as a peculiar creeping pain, which progressed gradually to the heart, having reached which, insensibility occurred, accompanied occasionally by twitching movements of the extremities and of the muscles of the neck and face. Bromide of potassium was ordered. A week afterwards he said that after the *aura* had crept up to the abdomen, he felt as if the dog that had bitten him was in his inside scratching violently; while during the fit he barked, and his expression was wild, fierce, and haggard. Salivation marked the close of the fit. Next day he attempted to bite and scratch all within his reach, and in many respects imitated the actions and gestures of a dog. Sometimes, *e.g.*, he would seize the pillow with his teeth, growling the while as a dog does with a rat. Occasionally he refused food, unless allowed to lap it, while, when threatened with a whipping if he would not stop barking and biting, he would turn round and whine as a dog does when struck. On the 10th day the symptoms were aggravated, and the saliva at times thick

and glutinous. As he had not slept for two nights he was ordered chloral, and continued the bromide. Two hours' sleep followed the second dose of chloral. Next day the lad was very violent, and in the evening was with difficulty restrained, the barking and howling being loud enough to be heard in the street. Pulse rapid and weak. After taking 30 grains of chloral he slept seven hours, but was more violent than ever after he woke. When presented with another dose of chloral, he became violently convulsed at the sight of the glass. Similar convulsions were produced by showing him wine, water, &c. ; in fact, he refused all fluids. Dr Finlay attributes this refusal simply to a suspicion that the chloral would be thrust on him in some other mixture. The bromide appeared now to have most influence upon the fits, and at the end of a fortnight from the commencement of the attack, the fits were only occasional, *but yet he sometimes barked during sleep.* The patient was now removed to St Mary's Hospital, where he soon completely recovered under the care of Dr Handfield Jones.

To the foregoing it should be added that the dog appeared to show no signs of rabies, but as the boy constantly asserted that he could not recover till he saw the dog dead, it was decided to kill it. Difficulties, however, were thrown in the way, and it was not until some weeks had elapsed, and the boy had quite recovered, that the matter was decided in court, nor is it stated whether the dog was ultimately destroyed. Dr Finlay is decidedly of opinion that the bite in itself was innocuous, and that the boy's symptoms were referable to the "Imagination, wrought upon by intense mental excitement and over-

powering Fear, conjuring up all the horrors of the actual disease, till some of its peculiar effects were in reality produced."

Sometimes there is, properly speaking, no spasm whatever of the pharynx, and there is little more than a delusion present—a hydrophobia-phobia. It is rather the effect of the action of mind upon mind, than what I intend to convey by the action of the mind upon the body.

Trousseau records several cases of imaginary hydrophobia of this kind. In one, a very mild example, a dog which had bitten a good many beasts that had died of rabies, tried to bite the arm of a gentleman. A few months afterwards he suddenly exclaimed, at breakfast, that he was seized with hydrophobia, for he could not swallow either fluids or solids. He was already beginning to rave, when his wife, who only believed that he had eaten too much, persuaded him to induce vomiting by tickling his throat with his fingers. The *malade imaginaire* was relieved, and no more was said about rabies. We need not suppose that here there was even spasm of the pharyngeal muscles; an extra large breakfast (after fasting in Lent) half-choked the poor fellow, who at once recalled the mad dog, and referred the symptoms to a wrong cause.

In another case a judge was out riding with his dog; they met a flock of sheep, and the dog bit those which he could catch, and although he obeyed his master's call, had a strange aspect. He then bit dogs and oxen, swam across a river, and a few hours afterwards died. Shortly after, the judge heard that many of the beasts bitten by the dog had died of rabies. He was alarmed, because he remem-

bered that on the same day the dog had licked his hand several times, and he now found some scars upon it. Seized with terror, he no longer dared to touch water, or to shave himself, and fully believed he had hydrophobia. A medical man tried, in vain, to calm his fears; for several days he was excited and delirious. At last being told over and over again, that persons seized with rabies died very rapidly, and that he could not, therefore, be rabid, since his dread of water dated already ten days back, he allowed himself to be persuaded, and his dread of water vanished (liv, i, p. 691-2).

So evident is the influence of the Imagination in the development of hydrophobia, that some distinguished medical professors have, as is well known, gone so far as to maintain that it is always due to this cause. The strange tendency which exists among many reasoners, when investigating the causes of morbid phenomena, to range themselves under one of two exclusive extremes—the first attributing *nothing*, and the last *everything*, to the Imagination—is strikingly exhibited here. Bosquillon, a Professor of Medicine, and Physician to the Hôtel Dieu, was utterly sceptical as to the existence of any virus, and from his observations in that hospital, came to regard the patients admitted for hydrophobia as “nervous” and fanciful. That they died was, he most justly held, no proof that the disorder was not imaginary, for the Imagination is, as we see, a psychical virus itself, which can and does frequently kill. Professor Dick, of Edinburgh, held that hydrophobia in man “is not the result of any poison introduced into his system, but merely the melancholy and often fatal results of panic fear, and of

the disordered state of the Imagination." "Those," he adds, "who are acquainted with the effects of sympathy and irritation, and panic, in the production of nervous disorders, will readily apprehend our meaning, and if our view be correct, the immense importance of disabusing the public mind on the subject is apparent" (lxii, i, p. 367).

The advocates of this view supported their position by such facts as these:—The existence of any virus has never been demonstrated. The assertion of Wright, Eberle, Hunefeld, and others, that the saliva of rabid animals and angry people will, if injected into the blood, produce hydrophobia, is denied by a great chemical authority, Lehmann. As the same cause ought to produce the same effect, and as the bite of dogs regarded as mad, is sometimes followed by no symptoms whatever, while the belief that a bite has been received is alone sufficient to cause all the symptoms, it was alleged that it is illogical to attribute them to any virus. The period of incubation, again, is altogether uncertain, differing in this respect from smallpox, &c., and apparently depending upon the strength of the Imagination in the individual. The good effects of cauterization are, it was said, more likely to be due to the distraction of the attention to a painful sensation, and to the definite hope inspired by vigorous treatment, than to the destruction of a poison which must have already entered the circulation and commenced its deadly work. The benefit derived from the diversion of the patient's mind by music, as recommended by Desault, and from various superstitious practices, countenanced this theory. Lastly,

as Demangeon observes, "if the hydrophobic virus has any existence, which to me seems highly problematical, it must be admitted that its effects do not differ in a single characteristic sign from those of the Imagination and certain inflammations of the brain and throat, and it is indisputable that it is often sufficient to calm the Imagination, and adopt an antiphlogistic course of treatment to stop the development of the disease" (lx).

Whatever force, however, there may be in these arguments to favour the relegation of hydrophobia to the domain of the Imagination, few, if any, will now be hardy enough to deny an actual material virus and a genuine, as distinguished from a nervous, hydrophobia. That such grave doubts should have been started is in itself a sufficient proof of the remarkable power exercised by the definite mental imagery of a particular disease, intensified by fear. Elliotson considered that the great distinction between real and imaginary rabies lay in this: that in the latter the fear of swallowing only is complained of, that there is no morbid irritability of the surface to the impression of air, and that there is no sudden catching of the breath.

Dr Copland admits that it is "not impossible" that true rabies may be produced by mental influence, independently of the operation of an inoculated virus; but he does not allow that spasmodic symptoms, with a difficulty of swallowing, or even a dread of water—a *hydrophobia*—are sufficient proofs of the presence of a disease identical with that which the bite of a mad animal causes. I think, however, it must be admitted that the approximation to identity is as great as can be expected from

the operation of a physical agent in the one case, and a psychical one in the other.

The region of the cerebro-spinal axis morbidly affected, in rabies, is generally regarded as the medulla oblongata. Sch. v. d. Kolk cites with approval the observation of Romberg, that the corpora olivaria are very highly injected in hydrophobia. Pathological research has, since the first edition of this work, discovered unquestionable lesions (congestion and leucocytes), but these are not peculiar to hydrophobia. The cerebral hemispheres are obviously often involved. Among the admitted difficulties attaching to the pathology of this disease, that is surely not the greatest which acknowledges the power of the Imagination in combination with Fear, to excite not only a paroxysm in the course of the disorder, but to originate a group of symptoms, by central excitation, which in a susceptible state of the nervous system closely resemble those of genuine rabies, and may terminate in death.

I have said nothing in the foregoing remarks of the terrible emotions which in genuine hydrophobia afflict the patient, and which, although not the cause, but the effect of the disorder, are at least in their turn the apparent cause of many of the symptoms. One of Dr Bardsley's patients "fixed his eyes with horror and affright on some ideal object, and then with a sudden and violent emotion buried his head underneath the bed-clothes." Dr B. inquired the cause. He eagerly asked if the doctor had not heard "howlings and scratchings?" On being answered in the negative, he suddenly threw himself on his knees, extending his arms in a defensive

posture, and forcibly throwing back his head and body. The muscles of the face were agitated by various spasmodic contortions, his eyeballs glared and seemed ready to start from their sockets, and at that moment, when crying out in an agonising tone, "Do you not see that black dog?" his countenance and attitude exhibited the most dreadful picture of complicated horror, distress, and rage, that words can describe or imagination paint (lxx, pp. 247-8).

Lawrence thus graphically refers to the Imagination as the immediately preceding cause of symptoms in the course of the disease. "The patient is pursued by a thousand phantoms that intrude themselves upon his mind; he holds conversation with imaginary persons; he fancies himself surrounded with difficulties, and in the greatest distress. These thoughts seem to pass through his mind with wonderful rapidity, and to keep him in a state of the greatest distress, unless he is quickly spoken to or addressed by his name, and *then in a moment* the charm is broken; every phantom of imagination disappears, and at once he begins to talk as calmly and connectedly as in perfect health" (lxii, i, p. 370). Here we see the higher or ideational centres primarily deranged, and the sensori-motor apparatus excited secondarily. Theoretically, there is no reason why the former should not be spontaneously the source of such dreadful mental images as to cause all the foregoing symptoms. That the disease may be spontaneous is, says Chelius, "beyond doubt." Why not, then, from Imagination and Fear?

Tetanoid convulsions.—A good example of opisthotonos,

the effect of a violent impression upon the feelings, has already been given among the cases met with in the Irish Revivals. In this case clonic convulsions were also present. In another case, a poor girl, æt. 7, "without the slightest appearance of any previous agitation or uneasiness of manner, was struck prostrate in a single moment. For a short time her body was found to be perfectly rigid, and her face colourless." Those who know how such a condition of the muscles can be artificially induced will not be surprised to find it said that "the eyes presented an enigmatical phenomenon beyond the power of philosophical reasoning to expound," and that there was a "long, breathless, and unwavering gaze."

This condition, which lasted about an hour, illustrates a state of transient, but intense rigidity, which is truly tetanic in its character, however trivial it may seem when contrasted with ordinary tetanus; a disease, whether traumatic or idiopathic, which is certainly a much more formidable affair than anything that is usually witnessed as the result of emotional excitement. Hystero-tetanus mostly affords examples in point. Dr Carpenter records a case of hysteria, accompanied by a tetanic condition of the muscles, which may fairly be adduced here in illustration of the action of certain emotional states upon the motor system, the exciting cause of the disorder being the disappointment of the affections, preceded by anxiety and excessive mental exertion.

"Complete opisthotonos coexisted with perfect coma;
. . . . then again there was trismus, lasting for five

consecutive days, without any other spasmodic action or loss of sensibility; this sometimes alternated with fits of yawning, in which the jaw was held open for half an hour together; at another period, the convulsions had more of the epileptic character, the face being distorted, and the limbs agitated, concurrently with a state of coma, but without laryngismus; with this alternated fits of laryngismus, without insensibility, and occurring during the expiratory movement; whilst, during the whole of this succession, there was paralysis of the extensor muscles of both lower extremities, with paroxysms of the most violent and prolonged cramp in one of them" (viii, p. 879).

Catalepsy.—The occurrence of this disorder is rare from any cause, excluding the cataleptic phenomena which are often induced artificially by Braidism.

I have not now in view the cases of mental disorder in which the limbs assume a more or less cataleptic form. Were I to include these under the term *catalepsy*—and no doubt they are closely allied—I could instance patients who were thrown into a condition of mental stupor with cataleptic symptoms, by mental shock.

Dr Crichton has recorded in his work the following case from Bonetus under "*Catalepsy*:"—"George Grokatzki, a Polish soldier, deserted from his regiment in the harvest of the year 1677. He was discovered, a few days afterwards, drinking and making merry in a common alehouse. The moment he was apprehended he was so much terrified that he gave a loud shriek, and immediately was deprived of the power of speech; when brought to a court-martial it was impossible to make him

articulate a word ; nay, he then became as immovable as a statue, and appeared not to be conscious of anything which was going forward. In the prison to which he was conducted he neither ate nor drank. The officers and the priests at first threatened him, and afterwards endeavoured to soothe and calm him ; but all their efforts were in vain. He remained senseless and immovable. His irons were struck off and he was taken out of the prison, but he did not move. Twenty days and nights were passed in this way, during which he took no kind of nourishment, nor had any natural evacuation, but then gradually sank and died" (lxiii, ii, p. 24). It is to be regretted that more particulars are not given in regard to the muscular system.

Among the causes of cataleptic seizures Copland enumerates the following predisposing and exciting ones, namely, among the former, violent and continued sorrow, great anxiety, unrequited affection, intense and sustained mental applications, and religious contemplations ; and among the latter, some violent mental impressions, religious enthusiasm, the passion of love, fright, terror, or uncommon dread, concealed mental emotions, and ungratified passions (lxx, Art. "Catalepsy"). After observing that he has had several opportunities of examining the phenomena of catalepsy from the commencement to the cessation of the attack, he says—"It is very remarkable how instantly a female, subject to catalepsy, is seized with it upon being startled or affected suddenly and unexpectedly by any cause. The effect is as immediate as that produced by lightning, and although the power of motion is entirely and universally lost, yet sensibility

is often but little impaired." ('Palsy and Apoplexy,' p. 229.)

Professor Lasègue states that he met in one year with ten cases, in a large practice among hysterical females. He found one class specially, if not exclusively, liable to this affection, those, namely, who were sluggish and more disposed to shed tears than be excited. "If one lays one's hands on their eyes, and closes the lids, they feel a peculiar drowsiness, and presently pass into the deepest sleep, from which hardly any stimulus will arouse them . . . The cataleptic rigidity is general or partial, complete or incomplete, more or less fugitive. It disappears as soon as the patient wakes." It is evident that Lasègue had by his manipulations produced a condition of the system similar to, if not identical with, well-known forms of hypnotism. "Two men passed into the state of cataleptic rigidity, as soon as any one closed their eyes. One fell into the deepest somnolence, the other did not sleep." Both died, but no morbid appearances were discovered. ('Biennial Retrospect' for 1865-6, New Syd. Soc., p. 119.)

Sauvages records in his *Nosologie* several striking examples of catalepsy :

In one case, that of a doctor's wife, the attacks were caused by the insulting conduct of a man ; the limbs, the hand and the fingers would preserve any position in which they were placed (vol. ii, p. 661).

In another case, that of a woman in the hospital of Montpellier, the cataleptic symptoms followed upon mental distress. When seated her arms and legs could be raised, and they would remain in this position without

support. Both patients recovered. They were clearly cases of the same description as those shown at the Salpêtrière at the present day, but without the aid of hypnotism.*

SECTION III.—Loss of Muscular Power : Paralysis.

General Remarks.—In the last section we have seen the influence of the emotions in causing irritation of the sensori-motor centres, and the motor nerves, marked by the external signs of convulsive action of the muscles ; in the present section we have to consider the effects of the same influence when it causes loss of function, indicated by muscular paralysis.

“Violent emotions of the mind” were enumerated by Aretæus among the causes of paralysis, and most medical writers have referred to them when treating of the ætiology of this disease, or rather symptom of disease. They have not, however, always discriminated between the different pathological conditions which may accompany emotional paralysis. It is evident, however, that these conditions widely vary—that in some cases there is what is ordinarily understood as a functional derangement, merely, of the motor centres, while in others, palpable organic changes take place, as when the rupture of a vessel occurs from the vascular excitement induced ; and, again, the motor centres may be only apparently or secondarily affected, as in many cases of hysteria. In-

* For description of the cataleptic state induced by Hypnotism, see the description of the phenomena at the Salpêtrière in M. Charcot's *service*, at the end of this work.

numerable are the instances which show that the motor centres are frequently enfeebled by the abnormal play of emotion upon them, and that they are for a time really unable to respond to, at least, ordinary stimuli. An emotion may also be conceived to cause structural change in the higher centres of the encephalon.

Dr Jackson's explanation of the effect of disease of a portion of the hemispheres upon the motor tract, consists in supposing that it induces disorder of the circulation in an arterial region, which includes the corpus striatum. That in this way the higher often affect injuriously the lower centres would seem highly probable.

It is easy to understand how, from Fright or sudden Joy, there may be a shock, more or less temporary, to the motor centres, by which some part is rendered unable to respond to the stimulus of the Will, or of ideas, or emotions, just as a man is sometimes deaf for days after firing a cannon, or is blind for a time after his eyes have been subjected to intense light.

In considering the changes which occur in the tissue of the brain and the vessels, the frequently felt difficulty of determining their order of sequence arises; but certainly when, from an overwhelming mental shock, a man becomes paralysed, it seems most natural to conclude that the first event in the series is a change in the normal condition—the molecular arrangement—of some portion of the brain-tissue, which is transmitted simultaneously to the conductors of voluntary motor power, producing transient or permanent effects, according to its force and the weakness or proclivities of the part upon which it falls, and to the vaso-motor nerves, causing

sudden vascular changes in the brain which interfere with its nutrition. So, in two ways, mental shock causes paralysis; directly, through the direct nerve channels, and, indirectly, through the vaso-motor nerves. These changes are severally indicated by outward signs of muscular paralysis, and altered vascularity and nutrition.

Frequently, then, as vascular changes, occasioned by Emotion, may cause the morbid condition of the nervous tissue which entails paralysis, it seems very probable that a mental shock may directly produce molecular changes in the brain and motor system, independently of those which arise from congestion, anæmia, or rupture of a blood-vessel. Handfield Jones has done much to demonstrate the possibility of exhaustion of the nervous centres without appreciable physical change. Violent emotion may well cause what he calls primary paresis of ganglion-cells in the encephalic, or spinal nerve centres. It is quite consistent with this, that almost simultaneously with the shock, and as long as this paresis lasts, the sympathetic should be in an opposite condition, as indicated by the pallor of the face.

Under the head of spasm of cerebral vessels, Dr Bastian would place many cases of emotional and also epileptic hemiplegia; also a very few of hysterical paralysis. The speedy recovery which may take place lends force to the idea, as he points out, that mere molecular and recoverable damage has occurred. "We must not forget, however, that the exciting causes of such attacks may entail further changes. They may at the same time give rise not merely to spasm but to actual rupture of the vessels in the motor ganglia, or they may set up nutritive

changes in the nerve tissue which may subsequently lead to thrombosis in the part" (xlvii, April 25th, 1874). Dr Bastian then refers to a case in University Hospital as a good example—a young woman, "in whom a more permanent hemiplegic condition was suddenly established under the influence of strong emotion."

In emotional excitement we are ourselves conscious of the rapid alterations which take place in the circulation in the brain—the rush, the throbbing, the vertigo, the tinnitus aurium, &c. That the brain tissue should suffer, and paralysis should supervene, in a certain proportion of cases (those in which the cerebral vessels are weak or diseased), is natural enough. We cannot, therefore, doubt that emotional paralysis is not unfrequently due to extravasation, as well as the opposite condition of deprival, of blood. This disturbance of the cerebral circulation may doubtless arise, either indirectly from the increased force and frequency of the heart's pulsations, or directly from the influence exerted by the emotions on the vessels of the brain.

Total paralysis—General loss of muscular power—not what is understood by actual palsy—as the result of emotional shock, is well illustrated by a reference to the sad scenes in Ireland during the Revival, from which we drew such striking examples of convulsion. We are told that "a great number were smitten down suddenly, and fell as nerveless and paralysed and powerless, as if killed instantly by a gunshot." A girl, æt. 14, while singing, fell down instantly, deprived of speech and sight, "the mind as active as ever." This occurred in the evening; in the night she slept three hours and

awoke in the same condition, and remained so till the next day—eighteen hours altogether—when she regained her voice and sight as suddenly as she had lost them. Medical remedies had been tried, but without effect; mental impressions, similar to those which caused, cured the malady.

Hemiplegia.—A case from Dr Todd has already been given in connection with the loss of speech. Many cases of hysterical hemiplegia are clearly of emotional origin. Dr Todd considered absence of face and tongue palsy characteristic of this affection. The case of a young woman, æt. 30, subject to hysteria, is cited by Tissot, from Hoffmann ('Opera omnia,' t. iii, p. 202, xxxv, 1865, p. 162). Terror suspended the uterine functions and caused, first, painful spasms of the limbs, and then hemiplegia of the right side; of what duration is not stated.

In the following case, under the care of Dr Stewart, reported by Dr Handfield Jones, hemiplegia was accompanied by impairment of speech:—

"Mr —, æt. 40-45, of gouty family and very nervous temperament, had long been subject to attacks resembling laryngitis. Just before his illness on this occasion, he had been in great anxiety on account of his wife's health; had been fatigued while nursing her, and with various cares. He had no renal disease. While going upstairs to his wife's bedroom, in advance of the medical attendants, he suddenly staggered, and would have fallen backward had he not been caught. He was now found to be quite hemiplegic on the right side, consciousness unimpaired, speech nearly lost, face very much

distorted. He was put to bed, slept tolerably, and next morning when seen at 8 a.m., all symptoms of palsy had disappeared, but returned again after breakfast. *The paralysis ceased and recurred again several days in the same manner*, but he was always free from it in the morning. Some time after it ceased to recur, any nervous excitement or extra fatigue would reproduce the disorder in a greater or less degree. Shortly afterwards he was seized with complete aphonia, and the same has repeatedly occurred subsequently, but has twice been removed by galvanism. In the winter of 1861-62, he had a return of the paralytic symptoms, accompanied by rheumatic pains" (lxxi, p. 481).

It is very interesting to observe that the hemiplegia occurred on the right side. It is in accordance with what might be expected, that where mental strain is considerable, the left hemisphere is worked more severely than the right, and would consequently be the first to fail.

Dr Jones states, that in the opinion of three eminent medical men, there existed no organic disease, and remarks that the paralysis is fairly attributable to the exhaustion of nerve power, the chief cause being great anxiety.

Marshall Hall records in his 'Practical Observations in Medicine,' that two cases of hemiplegia under his care at the time of writing, were induced by parental anxiety. In the 'Medical Times and Gazette,' May 23rd, 1868, there is a short report of a striking case of paralysis induced by Fear. It occurred at the Limerick Sessions, where two men were charged with having assaulted a relation. "The prosecutor (Roche) sum-

moned his own father as a witness. The mother of the prisoners, exasperated at the prospect of her sons being sent to prison on the evidence of her own relative, gave expression to her feelings in a malediction, praying that when the old man left the witness-box he might be paralysed; and paralysed he was accordingly, and had to be taken to the hospital. Such miraculous illness not yielding readily to ordinary modes of treatment, the old lady has been requested to remove her curse by spitting on the patient; but this she sternly refuses to do, and the man remains in the hospital."

On the prognosis of emotional hemiplegia Dr Todd remarks that, although it promises ultimate recovery, it is often very slow.

A very ancient synonym for paralysis—aphonia—indicates the frequency of impairment or loss of power over the vocal organs in this affection. Paralysis of emotional origin is, indeed, most frequently seen in connection with loss or impairment of speech. Of course, this symptom may be associated with widely different conditions of the nervous system—with lingual paralysis, paralysis of the laryngeal muscles, or with inability to recall words, &c.

Speechlessness, in short, may result from disorder (loss of function) of the grey matter of the convolutions, the fibres which connect them with the sensori-motor ganglia, these ganglia themselves, or the motor nerves proceeding thence to the muscles employed in speech.

Thus it is clear that a violent emotion may so affect the intelligence that, although a person can move his muscles, he no longer has the right idea at hand to com-

municate, and is speechless in consequence ; there being, in fact, no motor paralysis. Again, he may have ideas, and may be unable to communicate them by vocal signs—by speech—this condition arising from a break in some of the fibres passing from the convolutions to the motor centres, which prevents the Will being transmitted* to the central ganglia, or, as is more probably the case, from such a change in the motor centres that the nerves supplying the muscles engaged in speech, those, namely, of vocalisation and articulation, are paralysed. The disturbing influence already referred to, of a part of the brain, the function of which is not motor, upon one which is, admits of application here.

Mild and transitory forms of speechlessness are familiar to all, and may not deserve the name of paralysis, but they indicate the initial stage. The Virgilian “*vox faucibus hæsit*” occurs to every one, and Shakespeare’s description of Collatine is a perfect description of the influence now referred to.

“ The deep *vexation* of his inward soul
Hath served a dumb arrest upon his tongue ;
 Who mad, that sorrow should his use control,
 Or keep him from heart-easing words so long,
 Begins to talk ; but through his lips do throng
 Weak words, so thick come, in his poor heart’s aid
 That no man could distinguish what he said.”

LUCRECE.

* Or the fitting word re-called—the “motor intuition,” Dr Maudsley would say, associated with a certain idea organised in the motor centres of speech by education. See his able paper “Concerning Aphasia,” in the ‘*Journal of Mental Science*,’ January, 1869.

Of Sir Philip Francis ('Junius') it is said in his biography, "Indignation would at times master his utterance. For betrayed confidence or violated friendship he had burning words of reprehension on paper : but his spoken comment scarcely got beyond a single word, muttered as if to himself, with clenched hand and knitted brow. 'Base, base ! He, too, the hound !' Without the aid of tone or gesture, he must often have been misunderstood" (xiii, ii, p. 395). Recurring here to the remarks formerly made in regard to the purposive character of emotional acts, it might be objected in these cases, that this very association of the emotions with important muscular movements is an actual disadvantage. Is not the utterance constantly choked thereby, just when we most desire to express ourselves ? It may be replied, that inarticulate utterances, rendered so by emotion, are themselves more effective than the best chosen words. A striking proof of this is given in Sir P. Francis's own description of the eloquence of Fox. "Panegyric," he says, "was not his forte, and when he attempted it, it was none the better for preparation. A few words of sorrow or applause, coming of themselves in the course of agitation of some other question, and starting from it as if they had escaped him ; a breathless pause, a broken sentence, and then a rapid return to his subject, as if for an instant relief, could not but have made a deep impression on any audience. *For who can resist the inarticulate sorrows of a wounded heart ?* His eulogy of Francis, Duke of Bedford, seemed to me a performance very unequal to the subject and the speaker. I am sure it made little impression, and the less because

it was the result of pains, and accompanied with an emphatic delivery. Had he unexpectedly heard of the Duke's death while he was speaking in the House, and sudden grief had made its way in a natural, unpremeditated burst of passion, which alone can be pathetic, I think he would have succeeded much better, even, possibly, enough to touch the androgynous heart of William Pitt. . . . If in a transport of grief his voice had failed him, *or his speech had ended abruptly*, there were but few men, even in the house of Commons, callous enough not to have been affected by the subject, the actor, and the scene."

When men are struck dumb by Terror or mental excitement of any kind, the pathological condition may, as we have said, vary, but usually we may infer there has been a shock to the motor centres, involving temporary paresis of the nuclei of the nerves supplying the muscles concerned in either articulation or vocalisation, or in both. These nerves no longer respond to volition, but gesture-language and writing remain. A case lately occurred at Aldershot, which illustrates the effect produced by passion; the passion of a man which, levelled at another, recoiled upon himself. It is reported by Major Miller, the Governor of the Military Prison there:—"One of our prisoners, on being checked at drill by one of the warders, wished that 'God Almighty would strike the warder dumb.' The prisoner was struck dumb on the spot, and did not recover his speech for seven days. During the period he was deprived of speech, he was strictly watched. There was no feigning whatever; the man was most wretched and alarmed."

(‘Good Words,’ Sept., 1870.) Dr Handfield Jones gives from ‘Casper’s Wochenschrift,’ 1848, the case of a sailor, witnessed by Paulini, when surgeon on board a vessel. A violent storm arose, threatening immediate destruction to all the crew. One of them, a healthy Dane, æt. 30, of fair complexion and light hair, was so terrified that he fell speechless on the deck. Sanguineous perspiration followed, and from this point of view the case has a special interest, to which we shall again refer. It is sufficient to add here, that as this symptom disappeared the power of speech returned, and the sailor was perfectly well after the storm had passed away.

In these cases—the Revival girl, the soldier, and the sailor—a powerful emotion produced concussion of the motor centre concerned in the expression of ideas by the muscles employed in speech. There was no power of articulation, but there is no reason to suppose they could not have expressed themselves by gestures or by writing.

Dr Todd in his ‘Clinical Lectures on Paralysis,’ which contain a definite reference to emotional paralysis, as observed in men of hypochondriacal habits and in women, remarks that “it most commonly consists in a simple loss of speech, occurring under some strong excitement, the power of speaking returning usually in a few days, and indeed generally very rapidly after the patient has regained the ability to pronounce one or two words, such as ‘yes’ and ‘no.’”

The case which Dr Todd gives by way of illustration is as follows :

“The patient was a man between 50 and 60 years of

age, of irritable temper and hypochondriacal habit. A question, respecting some very trifling matter, happening to arise one evening in his family party, some one present held out too strongly against his views, and this led to a vehement contradiction on his part, which was met by a counter-statement and a rejoinder, and thus he became excited to such a degree that his power of speech completely abandoned him. . . . The patient had full use of his muscles ; he had full power over his hands and feet ; he could sign a cheque, and his mental faculties seemed unaffected ; only he could not speak, and whenever he tried to do so, the attempt would end in a fit of crying. He continued in this speechless state for about a week, when he recovered, and when once he began, the power of speech returned fully in a very short time. Two years after this occurrence the same gentleman got into a similar argument and difference of opinion upon a matter equally trivial, and again became strongly excited ; but this time, instead of becoming speechless, he became hemiplegic on the left side, without mental affection, but with decided palsy of the left side of the face. The paralysis was not complete, for he could move the fingers and leg very slightly. After a little time, without any other treatment than that of removing, so far as possible, all exciting causes, he recovered to a great extent the power over the arm and leg ; but although the principal recovery took place about six weeks after the attack, he is now, four months after the occurrence of the hemiplegia, by no means quite well" (lxxiii, p. 283).

Dr Todd adds that, as he had never examined the

brain of patients suffering in this way, he could not say how far there had been lesion, but he thought it must be slight, if any, and resemble that occurring in the transient hemiplegia which follows epileptic seizures (see remarks, *ante*). In these cases he entirely discards the vulgar and convenient explanation of congestion, believing that the vessels only play a secondary part in the production of such functional derangement. Hyperæmia is only an effect of a morbid condition of the brain-tissue, or of the blood, or of its circulating force. In emotional paralysis, according to this view, the polarity of a certain portion of the brain is disturbed—exalted—and is immediately followed by exhaustion, as excessive muscular action exhausts and depresses the muscular force. This condition, if prolonged, may by the arrest of nutrition involve softening; but it is the transient form to which this explanation has more especial reference. In this case, however, judging from the subsequent attack, it seems probable that the first seizure was not an example of mere nervous shock, as in the previous cases, but of some vascular change. Indeed, from the “trifling” character of the exciting cause, it may be inferred that the brain was already disordered, and on the brink of changes involving paralysis.

Dr Lavirotte attributes, in the following case, the invasion of paralysis to Anger; but he thinks also that it *may* have been only a symptom. The muscles generally, including those of articulation, were paralysed, but the patient’s intelligence was unaffected.

Françoise Classin, aged 28, possessing a strong constitution and married. Two years ago she had a violent

altercation with her husband, and being herself in a great passion, she lost her speech. She became unable to walk or support herself, or eat without assistance. At the end of six months her speech had gradually returned, and she could walk a little and grasp large objects. She has subsequently recovered some power over her muscles, but has great difficulty in turning over the pages of a book, and in walking she is obliged to seek some support. She has never experienced any pain; with the exception of amenorrhœa, the bodily functions are healthy (xxxv, 1859, p. 451).

A different class of cases—those in which only the vocal cords are (functionally) paralysed, the tongue, lips, and palate remaining unaffected (as also the intelligence)—is illustrated by a case Mr Skey mentions in his ‘Lectures on some Medical Subjects’ (xlv, Sept. 22nd, 1866). It affords a good example of aphonia of emotional origin, in an hysterical subject, the nuclear centre of the recurrent laryngeal nerve being temporarily paralysed.

“The subject,” he says, “was a young lady of about 20, of pale complexion, and having cold hands and feet. Whilst I was engaged in conversation relative to her health, I somewhat imprudently remarked that a mouse was running about under the table at the end of the room. She uttered an exclamation of alarm, and in an instant so entirely lost the power of audible speech, that I was obliged to approach her and to put my ear close, to hear her. The ferocious cause of the mischief having paid the penalty of its intrusion by the loss of all it possessed on earth, the lady, in the course of an hour,

recovered her voice. Had this person been in sound and vigorous health, she would probably have sustained the shock to her nervous system with less derangement of it. The case is interesting, as showing the sudden influence of the mind on a particular nerve in the general system."

Mr Fletcher records a case of aphonia in a gentleman, brought on by profound Grief, Fear, and Remorse:—"There was no other symptom but that of aphonia about him, besides general languor and despondency. His voice had been gone for five weeks. I held a long, cheering, and soothing conversation with this very stout and healthy person, during which he became satisfied that there was no return of a complaint, the thoughts of which weighed heavily on his mind. He was directed to rise early, take the air, enter society, and drink a few glasses of wine after dinner. A week afterwards his voice had fully returned" (lxxiv, p. 327).

As a contrast to these cases of loss of power over the vocal muscles, take the following illustration of the influence of fright in causing serious cerebral mischief and "aphasia." I abridge from the 'Lancet' of Sept. 17th, 1870, the report of the case, which was under the care of Dr Habershon.

The patient saw one of her children scald herself, and ran and caught her in her arms; then, having handed her to another person, immediately lay down, and from that time remained for three days motionless, unconscious, and without food. On admission at Guy's, three weeks after, she could say two or three words very imperfectly, her pupils were equal, her physical powers unimpaired.

On being questioned, she indicated that she had great pain at the vertex of the head. Three days after, she appeared perfectly intelligent, but replied to almost everything, sometimes with a little hesitation, "Yes'm;" sometimes, however, to a question requiring a negative reply, two or three times repeated, she succeeded in answering, "No, m'm;" and once or twice she, with great effort, and after some failures, expressed one of the first two or three numerals, but days, weeks, months, and years, were quite beyond her utterance, and after several despairing shakes of the head, a great effort would end in the almost invariable "Yes'm." She remained quite unable either to read or write. Five days after, the pain in the head was less severe; she could make almost any reply, requiring no more than two or three short words, but the interrogator was still addressed as "mum." She also read one or two short words correctly, and was able to write her name distinctly. When again seen, four days later, she was walking about the ward, apparently in perfect health. She still complained of pain at the top of the head, and though her vocabulary was limited, and her speech sometimes hesitating, she was in a fairly convalescent condition.

Dr Hughlings Jackson informs me that he has not met with any evidence to prove that emotional disturbances produce aphasia. It occasionally happens, he admits, that after fright, anxiety, &c., the patient does not *talk*, but these cases, whatever their explanation may be, are not, according to him, cases which can be properly called aphasic. At any rate, they differ very much, clinically, from cases of aphasia produced by a structural

lesion. He does not believe that such one-sided symptoms as hemichorea, hemiplegia, &c., are ever *solely* caused by emotional disturbances. Hemichorea very frequently *follows* fright, but Dr Jackson holds that there must of necessity be some local change in the central nervous system, or the symptoms developed by fright would not be one-sided. Possibly the normal structural difference in the two hemispheres may render one *more* likely to give way under the influence of a *general* bodily disturbance such as fright. (Mr Callender has brought forward evidence to show that lesions of the right hemisphere are more likely to produce convulsion than lesions of the left hemisphere). But if so, this is the exception proving the rule; it is only substituting a physiological for a pathological difference. The symptoms which Dr Jackson believes may be attributed to emotional disturbance are—1st, such symptoms as nervousness, depression of spirits, and sleeplessness; 2nd, such as loss of voice and tetanus-like convulsion (so-called hysterical tetanus). As to the two last symptoms, he remarks that they show that parts of the central nervous system are affected which superintend movements largely involuntary.

Under the head of “Emotional Paralysis,” is the report of a case in the ‘Lancet,’ Aug. 11th, 1860, by Dr Wible, and although the employment of the term here is perhaps open to criticism, the case is not without interest, and, undoubtedly, the immediately exciting cause was emotional:—

“A gentleman, after being exceedingly desponding for ten days, and attaching more importance than usual to ordinary affairs of business, became on the 4th of July,

much excited in connection with a very trivial occurrence. This excitement was followed by entire inability to speak, and by facial paralysis. During the following night his condition was comatose, and on the next day, when a slate was given him, "he wrote ciphers perfectly unintelligible, but in the course of a few hours was able to express himself in writing. During this interval he was seized with several paroxysms of sobbing and crying, after which he again fell into a comatose condition, from which, however, he could at times be readily aroused." On the third day he was able to say "yes" and "no." From the 10th to the 20th of July he progressed slowly but satisfactorily, and was able to converse with tolerable distinctness. With the exception of slight loss of motion and sensation of the right angle of the mouth, and deviation of the tongue, he had recovered at the time of the report. Dr Wiblen ascribes the symptoms to slight pressure or structural change at the origin, or in the course of the lingual and glosso-pharyngeal nerves, but the higher centres appear to have been also involved.

The defect in this case, viewed from our present standpoint, lies in the absence of any apparent cause for the despondency. This depression of mind appears to have been itself a symptom of, and caused by, some cerebral mischief. It is true that some irritation in business occurred just prior to the attack, but it is expressly stated that it was trivial. The emotional condition and the paralytic seizure were alike the results of an abnormal condition of the brain. Still, the case is valuable, not only because the exciting cause of the paralysis was an impression on the mind, but because

emotional disturbance (originating *ab intra*) preceded the motor affection. The tendency of morbid emotional states, whether arising originally from within or from without, to pass on and affect the motor centres, is exhibited in this case.

Since the above was written, Dr Wiblen has kindly sent me a short report of the subsequent history of this case. In reply to my inquiry whether the despondency could be traced to a sufficient cause, he says (Nov. 5th, 1870), "the patient was in very good circumstances, and had no reason to be otherwise than most happy," a fact which confirms the foregoing remarks in regard to the primary cerebral origin of the patient's mental condition. This is further borne out by the sequel of the case, which proved to be of no merely functional and transitory character. "It went," he states, "from bad to worse, and the patient died about two years afterwards. He had all the same symptoms as described in the 'Lancet,' up to the time of his death. He was a very careful man as to mode of living. His grey convolutions were drilled with small cavities." He adds that he has seen two other cases since—both died—and that the late town-crier of Southampton was in a similar condition.

I am able to add, through the kindness of Dr Lockhart Clarke, a report of his examination of the brain. The pia mater generally was very much thickened. The grey substance of the convolutions had an unusually pink colour. On the *right* side from behind forward, through the posterior and middle lobes, nothing more unusual was observed until reaching the optic thalamus. At the deeper part of this body and in the cerebral

substance, on its outer side, there was a great deal of red softening. Patches of red softening were also found at the anterior part of the corpus striatum. On the *left* side of the brain there was found, in the middle of the optic thalamus, a cavity or cyst about the size of a pea, and containing a yellowish fluid outside the thalamus; the cerebral substance was softened, reddish-black in colour, and infiltrated with fluid, which, under the microscope, was found to be loaded with exudation or compound granular corpuscles. The cerebral matter itself contained these bodies in abundance, besides a vast number of molecular particles. In the central white substance of the cerebellum, around the corpus dentatum on each side, there were two or three small cysts. One of them contained a perfectly milky fluid, which consisted of fat and oil particles. The medulla oblongata was softened and unhealthy along the fourth ventricle. Nothing remarkable was found in the spinal cord.

Professor Ball, of Paris, who explains the occurrence of sudden dumbness, in some instances, by a spasm or cramp of a small area of the vessels of the brain—"cerebral ischæmia"—records the case of a man, aged 45, who one day in 1877 entering hotly into a discussion, and falling into a violent passion, lost his speech. He had previously enjoyed good health, his heart was healthy, and he was steady in his habits. He could after the attack express himself in writing with facility. He had no intellectual disturbance—no true aphasia. Sensation and motility were normal. He could put out his tongue in any direction, but when he attempted to speak, a sort of convulsion affected it. It assumed the

form of a hard convex dome, and was forcibly pressed against the palate. He was pale. He recovered his speech within a fortnight without taking any medicine. The circulation, on Professor Ball's hypothesis, having returned to its normal channels, the function of speech was re-established (ciii, No. 1, 1881, p. 7).

Ptoſis.—Partial paralysis of the third nerve (levator palpebrarum) may arise from emotional causes. A case of ptoſis from grief is recorded by Dr Sutherland. "Sudden shocks, as is well known, cause local paralysis; thus ptoſis of both eyelids was produced in a patient of mine, when she heard of the intended marriage of a gentleman to whom she was engaged, under more than usually painful circumstances; the ptoſis of the eyelids soon disappeared, but the symptom was followed by an attack of melancholia, with a strong suicidal tendency" (lxxi, p. 120).

Paraplegia.—Professor Ball has referred to paraplegias caused by Fear in their bearing on cases of sudden loss of speech and hearing from the same cause, and in which he attributes the disorder to cerebral ischæmia. He quotes the German author, Brieger, who in similarly attributing these paraplegic affections to vaso-motor spasm, observes that a fugitive constriction of the vessels may determine evanescent disorder, while prolonged contraction may induce profound and lasting organic changes (ciii, No. 1, 1881, p. 18).

Dr Brierre de Boismont adds to a case illustrative of mental action upon the liver and stomach, one which similarly illustrates the effect produced upon the motor system :—

"A little peasant girl, Lucia Marini, eight years old, was separated for some time from her mother, a patient in the hospital. She had often begged to be taken to see her mother, but her relations, thinking it only "caprice," always refused. The child often repaired to the church to pour out her grief, and was one day found at the foot of the altar, sobbing and almost deprived of consciousness. Shortly after appeared symptoms of an affection of the cerebro-spinal axis, delirium, headache, and inability to stand. Leeches were applied to the head, and a seton inserted in the neck. This treatment relieved these symptoms, except the paraplegia, and on account of this she was removed to the hospital. Scarcely was she in her bed, than she begged again with tears ("caprice"!) to see and embrace her mother. The doctor (kinder, as is so often the case, than the friends of the patient) immediately ordered her request to be granted. Carried in the arms of the nurse to her mother's bed, she threw herself upon her neck, covered her with tears, earnestly inquired after her health, and seemed as if she could not caress her enough. After awhile she was requested to leave her mother and return to her bed. On their attempting to carry her, she sprang to her feet and cried out with delight that she had recovered the use of them. She regained her bed without effort or fatigue. During the time, about ten days, that she remained in the hospital, no unfavourable symptoms returned, and she occupied herself in assiduously waiting upon her mother" (xxxv, 1853, p. 537).

Another illustration of paralysis resulting from mental emotion may be found in Hoffmann (*loc. cit.*).

In this case the vicious conduct of a young man was discovered by his father, and the chagrin of the former caused paraplegia, which proved incurable.

Facial paralysis.—In the 'Lancet,' February, 1871, is reported a case of "Facial Paralysis from Fright," under the care of Dr Wiltshire in the West London Hospital—

"The patient was an intelligent little girl, aged 5 years. Four days previously she had been much frightened during her mother's absence from home. On the following morning the mother noticed that the child's mouth was drawn to the right side, and thinking that she was playing with her mouth, scolded her; but it soon became evident that the distortion was not voluntary. On admission it was found that, when the face was at rest, the paralysis was not betrayed, but during crying or laughing, the mouth was considerably drawn over to the right side. The left eye watered considerably; it could not be closed. There was no ptosis, nor were there any decayed teeth, enlarged glands, or evidence of the existence of worms. There was no otorrhœa or other symptom of disease of the temporal bone, nor squinting, nor paralysis of any other part of the body. The child was rather restless during sleep. A grain of bromide of potassium was ordered to be given three times a day; and thirteen days after admission the following note was taken:—'Has slept much better since taking the medicine. There is decidedly less paralysis. The left eye discharges a good deal, but is not inflamed.' On the thirty-second day it was noted that there was scarcely any evidence of paralysis remaining;

'in fact, the only sign is a slightly quicker and more complete blinking of the right eye than the left when one pretends to give the child a blow in the face.' On the forty-sixth day the child ceased to attend.

"Three months after, the child was brought again to the hospital suffering from scarlatinal dropsy. It was ascertained that she had had no return of the paralysis, and presented no trace of it."

I have not met with any other good instances of the influence of emotional excitement on the *portio dura* of the seventh, but the late Dr A. J. Sutherland asserted that "paralysis of the seventh nerve is a well-marked symptom of disease of the brain from severe mental shock." I observe the remark in Romberg, that "violent mental emotions have, in some instances, preceded its occurrence," and he refers to Joseph Frank in confirmation ('Prax Medic. Univer. Precepta,' 2nd edit. vol. i, p. 556).

Paralysis of sphincters.—The nerves that control micturition are, so far as the *sphincter vesicæ* is concerned, subject, as is well known, to temporary paralysis from emotional causes. Instances of temporary paralysis of both vesical and rectal sphincters are to be found in the annals of every war, on occasion of the first engagement. When the vesical muscle is itself paralysed, the non-striated fibres and the sympathetic are involved, and will be referred to in a subsequent section. The same remarks apply to the rectum and its sphincter.

Having now completed the survey of the influence of the emotions in the range of the motor nerves which supply the voluntary muscles, we proceed to pursue the

same inquiry in regard to those muscles over which the Will has no power—the non-striated muscles and the heart. Here also we might examine the phenomena according as they assume the form of simple contraction, spasm, or paralysis, but we shall only refer incidentally to these states.

END OF VOL. I.

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